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ABSTRACT

This study was conducted to investigate the relationship between teacher participation in a teacher collaboration program and teaching-learning outcomes. The consultation approaches promoted collegial interactions of teachers on a professional level and emphasized self-examination and development of classroom behaviors from the individual teacher's value and belief perspectives. A review of the literature reveals positive outcomes for both teachers and pupils when teachers engage in the use of collaborative consultation. Participants in this investigation consisted of 30 elementary school teachers from each of 2 suburban public school districts in British Columbia. Data were collected from classes at two points during the school year, and information based on the following constructs was obtained from teachers, teaching partners, and pupils as appropriate: teacher trust for the teaching partner; teaching partner's supervisory beliefs; degree of teacher reflection; teacher efficacy and classroom behavior; and pupil achievement, attitudes, and behavior. A discussion of the findings (displayed in tabular form) and implications and recommendations based on informants' suggestions complete the document. Appendixes provides descriptions of terms as well as data collection instruments and procedures. (Contains approximately 100 references.) (LL)

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A STUDY OF TEACHER COLLABORATION IN TERMS OF TEACHING-LEARNING PERFORMANCE

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A STUDY OF TEACHER COLLABORATION IN TERMS OF TEACHING-LEARNING PERFORMANCE[1]

In a review of "school effects" literature, Bossert (1988) states:

> . . . one key "effect" always is associated with the charter of our public schools: to provide children with the opportunities to learn reading, writing, and arithmetic. . . . Comparisons of effective and in-effective schools have begun to identify specific school-level factors that promote higher student achievements, particularly in the basic skills (pp. 341, 345).

With this concern for pupil learning and methods of improving pupil learning, it is not surprising to find that teachers have been identified as a school level factor promoting higher pupil achievement. Over the past two decades, educational researchers have conducted many studies investigating the effects, on teachers and pupils, of various teacher development approaches whose emphasis was teacher growth (e.g., Cummings, 1980; Donovan *et al.*, 1987; Showers, 1985; Smith, 1989; Stallings, 1985).

Many of these once promising teacher development approaches have fallen into disfavour with both the research community and the teachers themselves (e.g., Slavin, 1986; Stallings and Krasavage, 1986; Smith and Acheson, 1991). The failure of these teacher development approaches has been attributed to various factors, one of which is lack of teacher commitment traced to conflicts between teachers' own norms and values and those imposed externally by the model. Grimmett *et al.* (1992) write:

> Externally mandated change typically has a cataclysmic effect on teachers' morale, resulting in a strong sense of dependency. Teachers often feel overwhelmed by the new expectations when their actions are continually shaped by the directives of others. There is an accompanying sense of helplessness and powerlessness when heightened expectations appear to be beyond reach (pp. 185-186).

Of interest in this study were consultation approaches promoting collegial interactions of teachers on a professional level emphasizing self-examination and development of classroom behaviours from the individual teacher's value and belief perspectives. The goal of these consultation approaches is to permit teachers to make sense, through their own values and norms, of their classroom behaviours. Of particular interest is how teachers and pupils are affected when teachers interact professionally in four different ways, namely through: (1)

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[1]This study was assisted in part by a doctoral fellowship from the Social Sciences and Humanities Research Council of Canada (Award #752-91-2104)

collaborative consultation[2] (CC group), collaborative consultation in a team teaching environment (CCTT group), collaborative consultation without direct classroom observation by the teaching partner (CCNO group), collegial consultation without direct classroom observation by the teaching partner (CoNO group).[3]

Purpose

Previous research, mostly qualitative in nature, has investigated teacher consultation approaches and suggested that positive outcomes for both teachers and pupils result when teachers engage in the use of collaborative consultation. In the literature there does not, presently, exist a synthesis relating collaborative consultation to teaching-learning outcomes. At a theoretical level, the purpose of this study was to provide such a synthesis while simultaneously providing empirical evidence for the existence of the links posited in the literature. The analytic approach used in this study was also different from what has been previously reported in the literature, this study, primarily quantitative in nature, relied heavily on multivariate data analyses to begin to take into account some of the complex interactions between and among the various constructs of interest. The general problem under investigation is: "What is the relationship between teacher participation in a teacher collaboration programme and teaching-learning outcomes?"

Background

Many authors (e.g., Sergiovanni and Starratt, 1993; Acheson and Gall, 1992; Little, 1987; Lovell and Wiles, 1983) agree that if teachers can be encouraged to think critically about what they do in the classroom and then act upon those thoughts, that there should be an accompanying change in pupil achievement, attitudes, and behaviour. However, these linkages are conceived of logically and

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[2]Refer to Appendix A for a description of terms as used in this paper.

[3]A fifth group--consisting of teachers who did not consult with others (NC group)--was included in the study to compare to the four teacher collaboration strategies described.

have not, as yet, been identified empirically. The framework described below synthesizes the salient aspects described in the literature regarding the postulated linkages that exist between teacher collaboration and pupil effects in terms of: achievement, attitudes, and behaviour. Below, the four main "cells" of the framework are discussed individually. This is followed by a discussion of the hypothesized interactions between the "cells."

The Framework's First Cell

Some authors suggest that teacher consultation can lead to teacher growth through teacher reflection on classroom practice (e.g., Grimmett and Erickson, 1988; Nolan and Huber, 1989; Oberg, 1989; Grimmett and Crehan, 1990). The literature also suggests that teacher consultation can positively affect teacher efficacy, thereby, facilitating teacher growth (Ashton, et al., 1983; Cavers, 1988; Denham and Michael, 1981). The key modifier in each of the two preceding sentences is the word "can." This suggests that simply providing opportunities for teachers to observe and conference with each other does not necessarily produce positive changes for teachers and pupils. An important question to ask at this point is: what does the literature have to say regarding the effects of teacher collaboration on teacher growth?

In response to the question posed above, the literature identifies two important hurdles to overcome in order for teacher consultation to have the desired effects: (1) the development and maintenance of teacher trust and professional respect for the teaching-partner (Cogan, 1973; Goldhammer, et al., 1980; Lovell and Wiles, 1983; Acheson and Gall, 1992; Grimmett and Erickson, 1988; Sergiovanni and Starratt, 1993); and also related to the development and maintenance of trust, (2) the teaching partner's preferred mode of supervisory interaction should not be a directive one. The call for teachers to be treated as competent professionals who are accountable for their professional performance and in control of their professional development is expressed by many authors (e.g., Acheson and Gall, 1992; Cogan, 1973; Goldhammer, et al., 1989; Grimmett and Erickson, 1988; Lovell and Wiles, 1983; Sergiovanni and Starratt, 1993).
This suggests that in order for teacher collaboration to have positive effects on teaching, two conditions should be met: (1) teacher trust for the teaching-partner should exist, and (2) the teaching-partner's preferred mode of conferencing

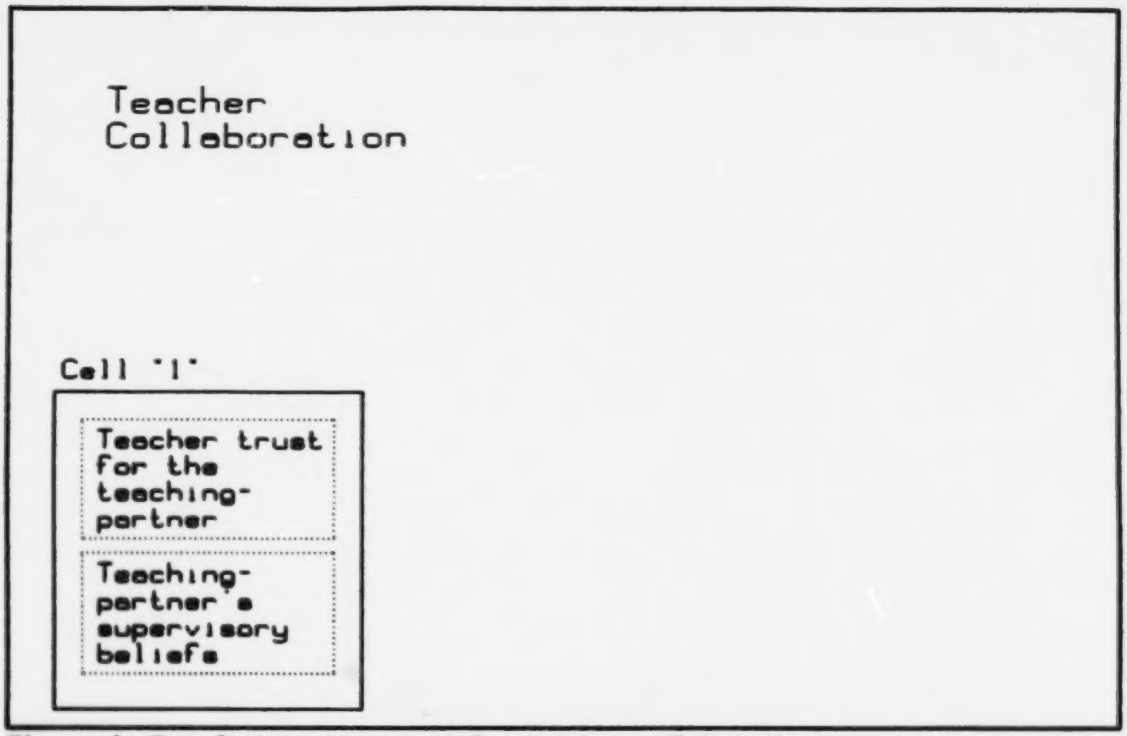

Figure 1: Two factors important for teacher collaboration.

interaction should be either, using Glickman's (1990) terms, collaborative or non-directive (see Figure 1). It is expected that collaboration between individuals who fulfil these requirements is prone to lead to increased levels of teacher reflection regarding practice and increased levels of teacher efficacy.

The Framework's Second Cell

At this point, the literature seems to branch regarding what can be expected from teacher consultation if the two conditions presented above are satisfied. Many authors indicate that increased teacher reflection can be anticipated as a result (e.g., Grimmett and Erickson, 1988; Nolan and Huber, 1989; Oberg, 1989; Grimmett and Crehan, 1990). Others suggest that gains in teacher efficacy can be expected (e.g., Ashton, *et al.*, 1983; Cavers, 1988; Denham and Michael, 1981). McCoombe (1984), and Robinson (1984) posit that increased teacher reflectivity positively affects teachers' self-esteem, as well as their beliefs regarding teaching. Cruickshank and Applegate (1981) suggest that increased

levels of teacher self-esteem and a positive outlook on teaching led teachers to become more concerned with self-improvement. Robinson's (1984) and Cruickshank and Applegate's (1981) conclusions suggest the existence of a positive relationship between the degree of teacher reflectiveness and the teacher's efficacy level. However, the literature is unclear regarding which affects the other. What is clear is that increased levels of either teacher reflectiveness or teacher efficacy are believed to affect pupils positively (see Figure 2). This ambiguity is likely the result of these previous studies not considering teacher reflectiveness, teacher efficacy, and pupil change simultaneously, choosing instead to consider interactions between only two of the three constructs at a time.

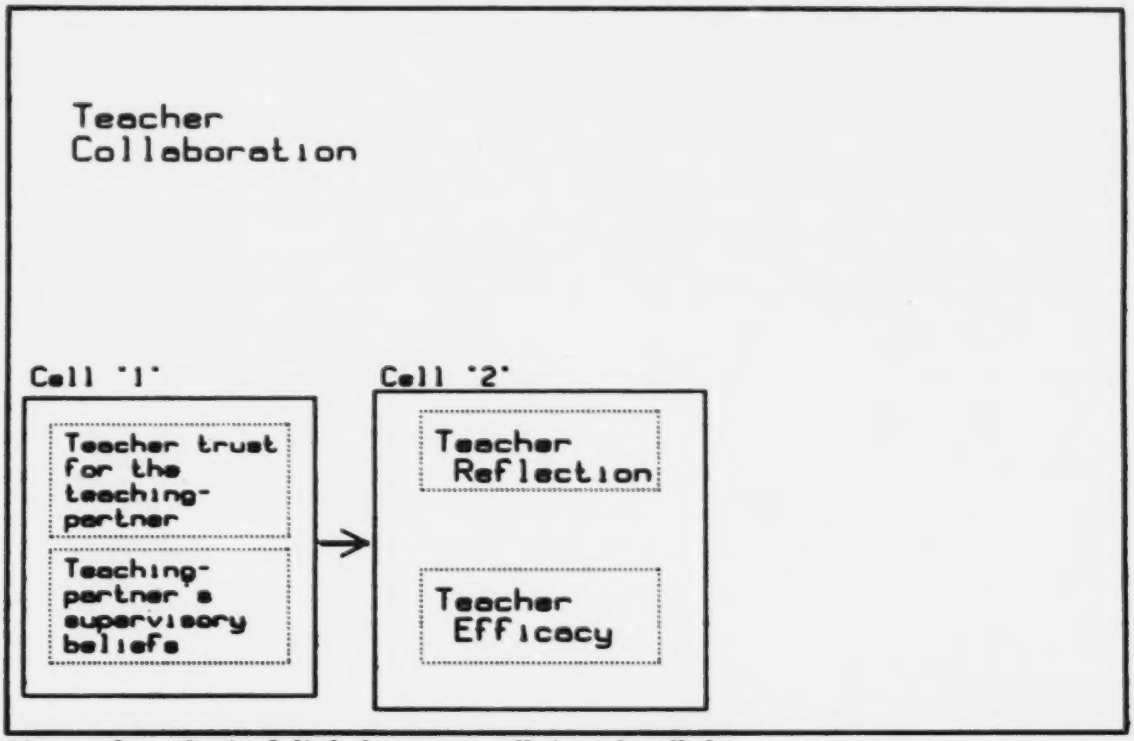

Figure 2: Posited link between cell 1 and cell 2.

A logical question to ask at this point is: by what mechanisms are teacher efficacy and teacher reflection related to the effects on pupils? An answer to this question is addressed in the next section. The discussion of a possible answer also sheds light on the literature's ambiguity regarding the relationship between teacher reflectiveness and teacher efficacy.

The Framework's Third Cell

To answer the question posed in the previous sub-section regarding the nature of the relationship between teacher reflection and positive pupil change, and between teacher efficacy and positive pupil change, it is necessary to consider two other questions. First, what do teachers change as a result of being reflective? and second, how do teachers function as their sense of efficacy changes?

Grimmett and Erickson (1988) provide an indication of the linkage between teacher reflection and pupil change. They state that ". . . suggested actions are entertained as hypotheses to be tested first by mental elaboration or reasoning and second by overt action" (p. 7). Stated differently, after reflecting on a situation and testing the potential outcomes of various solutions in the mind (presumably, the number of alternatives from which to make mindful selections increases) the teacher can implement overtly what he or she considers to be the "best" solution. Similarly, Sykes (1986) states that one of the criteria for identifying teacher reflection lies in:

> The use of knowledge sources internal to practice to explore and modify one's actions with student and students' learning being the primary source (p. 233).

Relating both of these excerpts to the first question posed above, one can conclude that the teacher behaves differently with respect to pupils after reflecting on problems of teaching (see Figure 3).

The linkage between teacher efficacy and positive pupil change is similar, if not identical, to that linking teacher reflection with positive pupil change. Re-visiting the premise on which Bandura's (1978) theory of "Reciprocal Determinism" is based provides the insight required to propose the nature of the link between teacher efficacy and positive pupil change. The premise is that teacher's efficacy attitudes influence behaviour, resulting in altered expectations which, in turn, affect efficacy. To put this another way, efficacy can be imagined to give the teacher confidence that there is the possibility of improving things by considering alternative approaches; if one believes that matters are beyond one's control, there is little point in deliberating about alternative approaches. In response to the second question posed above, it is the teacher's behaviour, as a result of considering a wider variety of alternatives thus increasing the possibility of identifying an effective one, which acts as the link between how

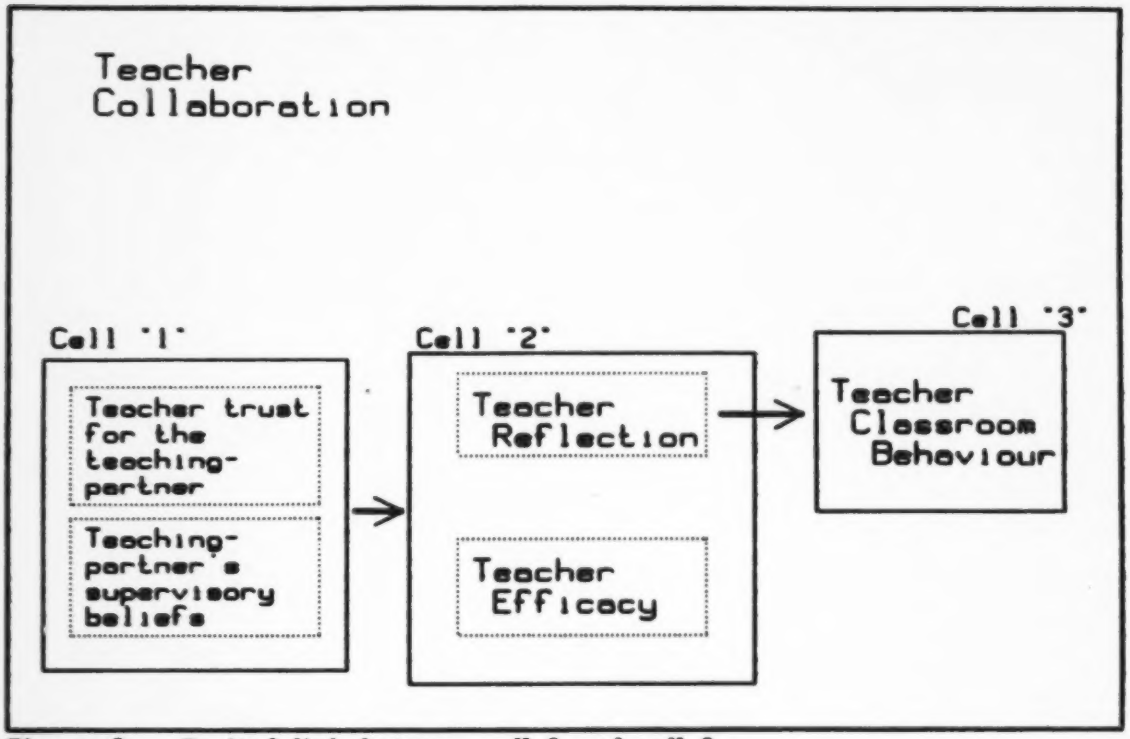

Figure 3: Posited link between cell 2 and cell 3.

efficacious a teacher feels and how pupils change.

Thus, at least logically, the ambiguity found in the literature and identified in the previous section is clarified: teacher efficacy likely affects teacher reflection which in turn affects teacher behaviour (see Figure 4). It also appears that the answer provided by the literature to the question regarding the mechanisms through which teacher efficacy and reflection are related to effects on pupils is that: (1) teacher behaviour is the link between teacher reflection and positive pupil change, and (2) teacher behaviour through teacher reflection is the link between teacher efficacy and pupil change. In the next sub-section the nature of the pupil gains that can be anticipated will be discussed.

The Framework's Fourth Cell

It is suggested in the literature that the effects of teacher behaviour will be evident in pupils along three possible dimensions--corresponding to Plato's trilogy of human condition: (1) achievement, (2) attitude, and (3) behaviour

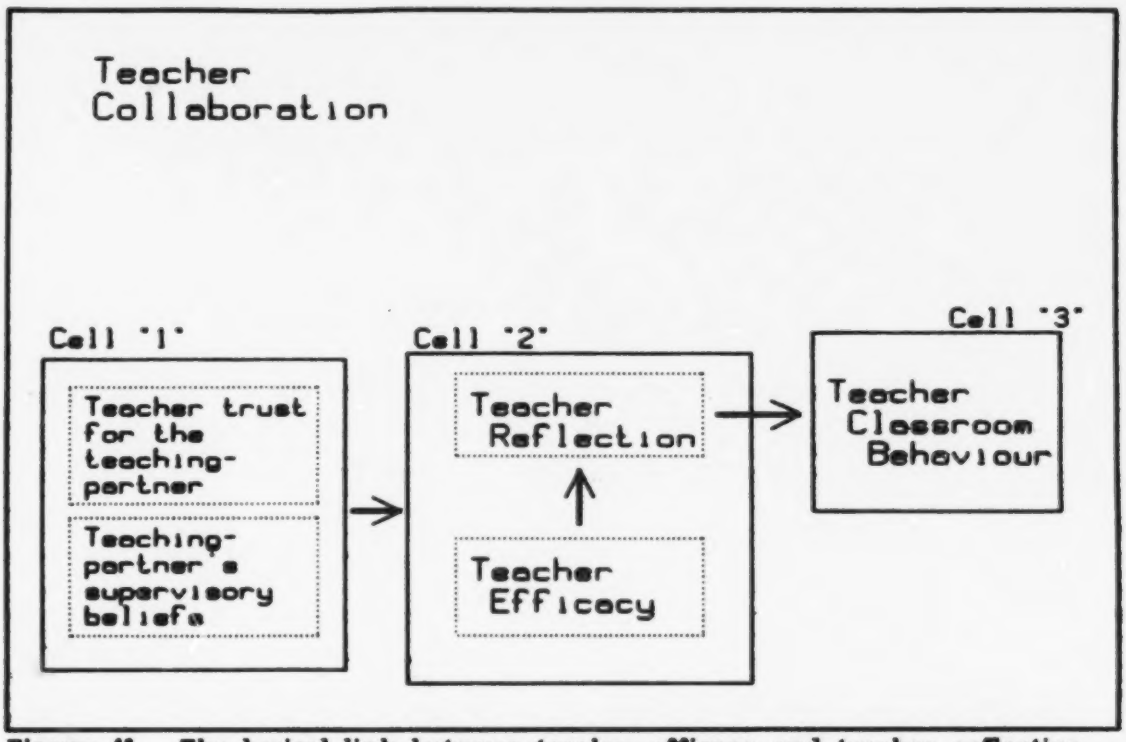

Figure 4: The logical link between teacher efficacy and teacher reflection.

(Acheson and Gall, 1992, Little, 1987). The four cells of the framework have been presented in a linear fashion. Essentially, it is expected that teacher collaboration will, if teacher trust for the peer-observer is present and the peer-observer's preferred supervisory interaction mode is not directive, positively affect teacher reflection, which is also affected by teacher efficacy. Teacher reflection then positively affects teacher behaviour toward pupils, and pupils then show the manifestations of the teacher's positive behaviour in terms of positive change in their achievement, attitude, and behaviour. This unidirectional linear relationship is displayed graphically in Figure 5.

Feedback Between the Cells of the Framework

Feedback between various cells of the framework is to be expected and even depended upon for teacher collaboration strategies, particularly collaborative consultation, to be successful. However, the study of the feedback between the cells of the framework was not considered crucial for the purposes of this study.

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The feedback between the cells of the framework is discussed here for conceptual purposes only and is beyond the scope of this study.

One of the purposes of teacher collaboration is to translate teacher concerns into goals, establish what specific observable behaviours reflect those goals, then interpret and modify instructional techniques to mitigate undesirable interaction patterns, or intensify desirable patterns (Cogan, 1973, Goldhammer, *et al.*, 1980; Lovell and Wiles, 1983; Acheson and Gall, 1992; Sergiovanni and Starratt, 1993). The data sources for this activity include the teacher and the students with whom the teacher interacts. In the framework that has been developed, a provision needs to be made which allows information or data regarding aspects of the teacher and the students to feed back into the teacher collaboration process. Also, teacher reflection is predicated on the fact that the teacher will have something to reflect about (Dewey, 1933; Schön, 1983; Garman, 1986; Sykes, 1986; Grimmett and Erickson, 1988). Since teacher reflection is central to the collaboration process and since teacher reflection is based on the critical analysis of information originating from the teacher and the students, the framework developed here needs to show a path for information or data to feed from the teacher and the students to be reflected upon by the teacher. The literature also indicates that feedback from the teacher, and the students with whom the teacher interacts, to teacher efficacy is required in this model (Bandura, 1978; Denham and Michael, 1981; Ashton, et al., 1983; Gibson and Dembo, 1984). The addition of these feedback loops is demonstrated graphically in Figure 5 through the use of the dotted lines between cells 3 and 2, and between cells 4 and 2.

Specific Research Questions and Hypotheses

From this framework, and related to the general question of interest presented earlier, emerge five specific questions of interest. The first two include:

(1) Can the teaching-learning variables, taken together, distinguish between the CC, CCTT, CCNO, and CoNO groups?

(2) Can the teaching-learning variables of teacher efficacy and behaviour, and pupil achievement, attitude and behaviour--taken together--distinguish between the CC, CCTT, CCNO, CoNO, and NC

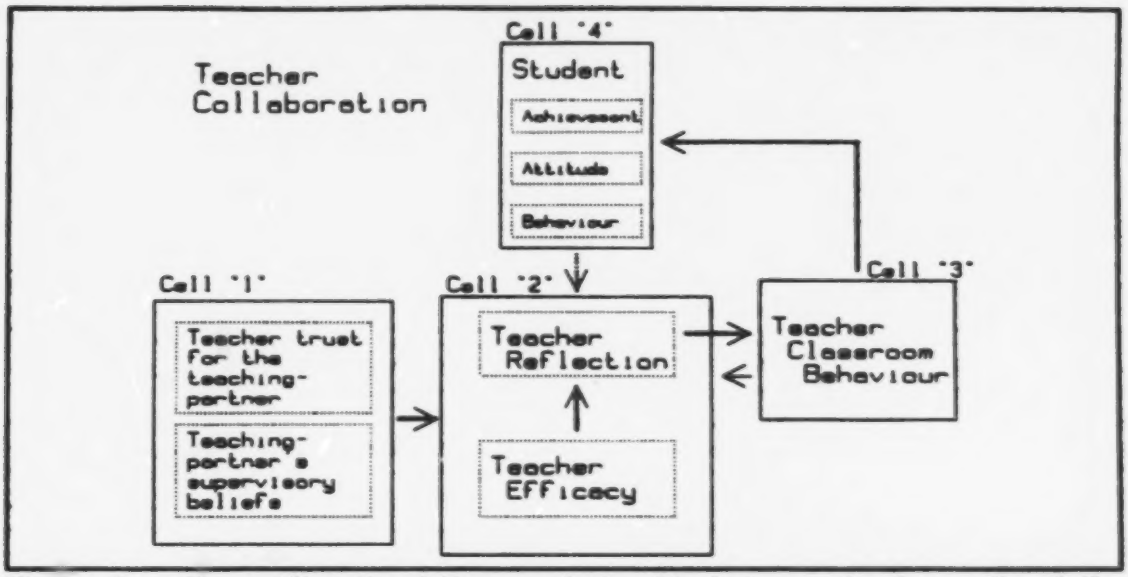

Figure 5: The unidirectional linear relationship between the four cells of the framework (shown with solid lines), and the anticipated feedback relationship between the cells (shown with dotted lines).

groups?

The three remaining specific questions are derived from the links hypothesized between and within each of the framework's cells. The third question is related to the links existing between and within the framework's first and second cells:

(3) After accounting for the covariation of the variables within the first cell and within the second cell of the framework, are trust for the teaching partner and the teaching partner's preferred mode of interaction related to teacher efficacy and teacher reflection?

The fourth question is related to the links existing between and within the framework's second and third cells:

(4) After accounting for the covariation of the variables within the second cell and within the third cell of the framework, how strong is the relationship and what are the underlying links between teacher reflection and teacher efficacy, and teacher classroom behaviours?

The fifth question is related to the links existing between and within the framework's third and fourth cells:

(5) After accounting for the covariation of the variables within the third cell and fourth cell of the framework, how strong is the relationship

and what are the underlying links between teacher classroom behaviours, and pupil outcomes?

Paralleling the specific questions are five substantive research hypotheses. The hypotheses to be tested are:

(1) of the four collaboration groups, the CC group differs most from the other groups when all the teaching-learning variables are taken at one time;

(2) of the five groups, the CC group differs most from the other groups when teacher efficacy and behaviour, and pupil achievement, attitude and behaviour are taken simultaneously;

(3) strong links exist, after taking into account the covariation between the variables in each set, between the first set of variables--trust for the teaching partner and the teaching partner's preferred mode of interaction--and the second set of variables--teacher reflection, general teaching efficacy and personal teaching efficacy;

(4) strong links exist between general teaching efficacy, personal teaching efficacy and teacher reflection, taken together to account for the covariation between the first set of variables, and teacher classroom behaviours, taken together to account for the covariation between the second set of variables;

(5) strong links exist between teacher classroom behaviours, taken together to account for the covariation between the first set of variables, and behavioural, attitudinal, and academic pupil outcomes, taken together to account for the covariation between the second set of variables.

Method

Participants

The sample obtained for the study consisted of 30 primary-four to intermediate-four classrooms (or split level grades within that range), 15 from each of two suburban public school districts in the Lower Mainland of British Columbia during the 1991-1992 school year. The sample obtained from District "A" self-selected from an estimated 196 teachers teaching primary-four to

intermediate-four (Source: District "A" Assistant-Superintendent's Office). The sample obtained from District "B" self-selected from an estimated 570 teachers teaching primary-four to intermediate-four (Source: District "B" Superintendent's Office). All subjects were volunteers; it was not possible to use any variation of probability sampling to choose classrooms within each district. As such, how well the sample represented the target population is not known precisely. However, as described below, the sample seemed reasonably typical, and on that basis the study was carried forward.

A summary of descriptive statistics regarding the sample is found in Table 1. It should be noted that the number of female teachers in the sample is double that of the male teachers, this is not surprising given the fact that elementary level female teachers greatly outnumber elementary level male teachers. Experientially the subjects in the sample ranged widely. District "A" teachers who volunteered for the study had just slightly more experience teaching than the district average for elementary teachers. At first glance District "B" teachers appear to have considerably more experience than other elementary teachers in the district; however, a t-test (α = .05) reveals that, in terms of experience, the District "B" teacher-volunteers are representative of other teachers in the district.[4]

It should be noted that when data collection started in September of 1991, 35 teachers were involved in the study. The five teachers who withdrew from the study did so under the following circumstances: (1) one teacher left her teaching position at the end of the first term (28 pupils were also dropped from the study as a result), (2) a second teacher did not provide the necessary teacher and teaching partner consent forms for participation in the study (16 pupils from this

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[4]As seen below, statistical significance of the difference between the mean teaching experience of the sample drawn from district "B" and the mean teaching experience reported for all elementary teachers in the same district was not found:

Statistical hypotheses: H_0: $\text{barX}_{\text{sample}} = \text{barX}_{\text{district}}$
H_1: $\text{barX}_{\text{sample}}$ does not equal $\text{barX}_{\text{district}}$
decision rule: do not reject H_0 if $-t_{crit} < t_{obs} < +t_{crit}$
$t_{obs} = (\text{barX}_{\text{sample}} - \text{barX}_{\text{district}})/s_{barI} = (17.5-10)/6.45 = 1.16$
$t_{crit} = |-t_{\alpha,n-1}| = |-t_{.05,16}| = \pm 1.76$
Conclusion: since $-t_{crit} < t_{obs} < +t_{crit}$, do not reject H_0

Table 1. Descriptive statistics of the sample and sub-samples from the two participating districts.

	District "A"	District "B"	Total
Number in sample			
male	7	3	10
female	8	12	20
total	15	15	30
Teaching experience for sample (years)			
range	2 - 20	2 - 28	2 - 28
mean	9.93	17.47	13.70
std. dev.	6.23	6.45	7.31
Average Elementary teacher experience within district (years)	≈ 8[a]	≈ 10[b]	
Total number of pupils in participating teacher's classes	364	402	766
Student sample			
male	115	117	232
female	112	132	244
total	227	249	476
Proportion of possible pupils volunteering	62.4%	61.9%	62.1%

[a]Data supplied by District "A" Assistant Superintendent's Office. [b]Data supplied by District "B" Superintendent's Office.

teacher's class were also dropped from the study), (3) two teachers from one school indicated that their involvement with another study was "just too much to handle" (32 pupils were dropped from this study as a result), and (4) one teacher did not meet the criterion of teaching her class at least half time (15 pupils were also dropped from the study as a result).

The 26 teaching partners, 13 from each district, included 19 females (73.1%) and 7 males (26.9%). The total teaching experience of the teaching partners in

district "A" ranged from 2 to 17 years, with a mean of just under 7 years; the total teaching experience of the teaching partners in district "B: ranged from 13 to 22 years, with a mean of just over 17.5 years. With respect to the pupils involved in the study, all pupils from the 30 classes who were present during both days of observation and questionnaire administration, and who provided consent forms signed by both themselves and a parent or guardian formed the pupil component of the sample. Table 1 also provides a break-down of the pupils participating in the study.

Data Collection: Instruments and Procedures

Data were collected from intact classes at two points during the school year. The first phase of data collection took place during October and early November of 1991, the data from this phase are referred to in this study as the "pre-measures." The second phase of data collection took place during May of 1992, the data from this phase are referred to here as the "post-measures."

Data for the following constructs were obtained from teachers, teaching partners, and pupils as appropriate: (1) teacher trust for the teaching partner, (2) teaching partner's supervisory beliefs, (3) degree of teacher reflection, (4) teacher efficacy, (5) teacher classroom behaviour, (6) pupil achievement, (7) pupil attitudes, (8) pupil behaviour. Data were not collected for items 1, 2, and 3 for the NC group teachers. Table 2 provides a summary of the instruments used in the present study. Detailed descriptions of the instruments used to code the data and of how the data were collected can be found in Appendix B.

Data Analyses

The analyses of the data were carried out in four phases. In preparation for the analyses, variables from the pre- and the post-measures were assigned unique short names, these are found in Table 3 and are used in the remainder of this paper.

First, descriptive statistics for each variable were calculated to screen the data and gain a preliminary understanding of the data set. Second, group differences on the pre-measures were sought. A MANOVA was conducted on all of the pre-measure variables simultaneously to determine if the four collaboration

Table 2. A summary of the constructs and instruments used in this study.

Construct Measured	Instrument	Author(s)
Teacher trust for the teaching partner	Individualized Trust Scale (ITS)	Wheeless & Grotz (1977)
Teaching partner's supervisory beliefs	Supervisory beliefs Inventory (SBI)	Glickman & Tamashiro (1981)
Teacher reflection	Reflective Index (RI)[a]	
Teacher efficacy	Teacher Efficacy Scale (TES)	Gibson & Dembo (1984)
Teacher classroom behaviour	Our Class and Its Work (OCIW)	Eash & Waxman (1983)
Pupil achievement	Pupil Reportcards[b]	
Pupil attitude	School Attitude Scales for Children (SASC)	Randhawa & Van Hesteren (1982)
Pupil behaviour	Pupil Reportcards[b]	

[a]The RI was adapted from the work of MacKinnon who developed a framework for detecting refection in pre-service teachers (1985, 1986). [b]Pupil report cards are written by the classroom teacher for the purpose of reporting student progress to pupils' parents.

groups differed near the beginning of the school year; to determine if any of the five groups in the study differed at the beginning of the school year, a MANOVA was also conducted on all of the pre-measures, simultaneously, common to the five groups. Third, group differences on the post-measures were sought. A MANOVA was conducted on all post-measures simultaneously to determine if the four collaboration groups differed near the end of the school year; to determine if any of the five groups in the study differed at the end of the school year, another MANOVA was conducted on all of the post-measures, simultaneously, common to the five groups. Both of these MANOVA's were followed by post-hoc Discriminant Analysis to determine which groups differed and on what theoretical dimensions they differed. Fourth, to determine the nature of the links between the guiding framework's adjacent cells, three Canonical Analyses (C.A.) were performed using the variables within each pair of adjacent cells as the "first set" and the

Table 3. Unique "short-names" of variables used in this study.

	Pre-measure	Post-measure
CELL 1:		
Trust for teaching partner (ITS)	ITS1	ITS2
Supervisory beliefs (SBI)	SBI1	SBI2
Transformed ITS (reflected and inverted ITS)	ITS1T	ITS2T
Frequency of interaction		FREQ
CELL 2:		
Teacher reflection	RI1	RI2
Personal teaching efficacy	EF1P	EF2P
General teaching efficacy	EF1G	EF2G
CELL 3:		
OCIW (teacher behaviour)	OCIW1	OCIW2
OCIW sub-scales		
Enthusiasm	ENTH1	ENTH2
Feedback	FDB1	FDB2
Instructional time	INST1	INST2
Opportunity to learn	OPP1	OPP2
Pacing	PACE1	PACE2
Structuring comments	STRC1	STRC2
Task orientation	TASK1	TASK2
CELL 4:		
Pupil achievement	ACH1	ACH2
Pupil attitude	ATT1	ATT2
Pupil behaviour	BEH1	BEH2

"second set" of variables. All analyses were conducted using SPSS/PC+ Base, Statistics, or Advanced Statistics software (1990).

Results

This section reports the findings of the study. Four sections will be found below corresponding to the following: (1) difficulty in obtaining measures of teacher reflection, (2) data screening, and (3) analyses.

Teacher Reflection During Conferences

Two problems became evident in the measurement of teacher reflection through coding of conferences held between teachers and their respective teaching partners. From Table 4, it can be seen that: (1) given the relatively small size of the sample the rate of return of useable audio-taped conferences was not very good (61.5% and 57.7% respectively for pre- and post-measures); and (2) although, according to the terminology used in this study, teachers were thoughtful, they were not--with the exception of one instance in the pre-measures--being reflective during the audio taped conferences with their respective teaching partners. Consequently, it was decided that RI would not be entered as a variable in any data reduction procedures. Useable empirical evidence regarding the links between teacher reflection and the variables around it in the guiding framework remains unattained.

Table 4. Teacher Reflective Index measures for pre- and post-measures.

	Pre-measure RI[a]	Post-measure RI[b]
Reflective	1	0
Thoughtful	13	13
Information sharing	2	2

[a]Of a total of 26 teachers working with a teaching partner, 19 returned pre-measure conference audio tapes to the researcher--of these 3 were inaudible because of excessive background noise. [b]Of the same 26 teachers working with a teaching partner, 17 returned post-measure conference audio tapes to the researcher--of these 2 were inaudible because of excessive background noise.

Data Screening

Prior to analyses, the data collected for each variable were screened for normality (i.e., kurtosis and skewness), outliers (univariate and multivariate),

linearity, multicollinearity and singularity. All data were screened for normality using two techniques: (1) by determining skew and kurtosis values for each variable, and (2) by visual representation through histogram plots. All variables, except ITS2, exhibit reasonably normal distributions. Kurtosis and skewness values for ITS2 were found to be 5.804 and -2.361 respectively; these are significantly different from zero (α = .01). The ITS2 variable was transformed through reflection and inversion. Skewness and Kurtosis of the new transformed variable (ITS2T) were found to be normal. To maintain a "one-to-one" correspondence between the measures obtained during the pre-measures and the post-measures, it was decided that ITS1 would be similarly transformed. Skewness and Kurtosis of the transformed ITS1 variable (ITS1T) were found to remain normal. Although ITS1T, SBI1, ITS2T, and SBI2 are, from a statistical perspective, reasonably normally distributed; an examination of the frequency distribution histograms reveals that a ceiling effect may have been reached (see Table 5).

All data were screened for univariate and multivariate outliers. No univariate outliers are present in any variables except ITS2, transformation of this variable eliminated the outlier. Mahalanobis distances (α = 0.001) were determined in three regressions to screen for multivariate outliers, the regressions included: (1) premeasure variables, using ITS1T, (2) post-measure

Table 5: Obtained values compared to the minimum and maximum values possible for the Individualized Trust Scale and the Supervisory Beliefs Inventory.

	ITS1T	SBI1	ITS2T	SBI2
Possible range				
minimum	0.13	0	0.13	0
maximum	1.00	100	1.00	100
Mean	0.82[a]	8.3[b]	0.83[c]	7.2[d]
N	26	26	26	26

[a]15 scores were >0.80. [b]25 scores were <25.0. [c]16 scores were >0.80. [d]26 scores were <25.0.

variables, using ITS2T, and (3) OCIW2 subscales. No multivariate outliers were found (α = 0.001) for any of the variables.

Linearity was assessed by an examination of residuals plots derived from regressions of: (1) premeasure variables--including ITS1T; (2) post-measure variables, including ITS2T; and (3) subscales of OCIW2. The three residuals plots revealed that the variables are linearly related.

Multivariate analysis of variance requires that individual group variances and covariances be pooled together to form a single estimate of error. Tabachnick and Fidell (1989) state that "If the within-cell error matrices are heterogeneous, the pooled matrix is misleading as an estimate of error variance" (p. 379). They go on to recommend examination of the group sizes and the sizes of the variances and covariances associated with the respective groups so that they may be assessed as follows:

> If cells with larger samples produce larger variances and covariances, the α level is conservative so that null hypotheses can be rejected with confidence (Tabachnick and Fidell, 1989, p. 379).

In fact, this situation is exactly what has occurred in the data sets used in this study. Comparison of the group variance-covariance matrices from both the overall pre- and post-measures MANOVA's reveals that in all six pre-planned and three post-hoc analyses the larger variances and covariances are generally associated with the groups having more members (i.e., larger n). The null hypotheses are rejected in the pre-planned and post-hoc MANOVA's performed on the post-measurement data--this can be done with confidence because of the conservative alpha level. However, the null hypotheses are not rejected in the three MANOVA's performed on the pre-measurement data. In these three cases it is not expected that the null hypotheses were found tenable simply because of an overly conservative alpha level. The probability that there was no difference between the groups in the three MANOVA's is much greater than 50% (these are summarized in Table 6). Although the assumption of homogeneity of the variance-covariance matrices for each MANOVA has not been met, it is expected--as discussed above--that the effect is to make the alpha level more conservative so that rejection of the null hypothesis can be done with confidence. Furthermore, since normality is not violated, estimates of the population parameters--although not as good as when the homogeneity of variance-covariance assumption is not violated--can still be used from this dataset. Inferences drawn from this sample should be treated with caution.

TABLE 5. MANOVA summaries of statistics of groups on premeasures.

Variables used in MANOVA	Groups evaluated	Wilks lambda	Approx. F.	p =
ITS1T, SBI1, EF1G, EF1P, OCIW1, ACH1, BEH1, ATT1.	All groups with teaching-partners	0.346	.811	0.705
ITS1, SBI1, EF1G, EF1P, OCIW1, ACH1, BEH1, ATT1.	All groups with teaching-partners	0.331	.853	0.656
EF1G, EF1P, OCIW1, ACH1, BEH1, ATT1.	All groups	0.590	.483	0.976

In the present study, instances of multicollinearity and singularity were sought using two techniques. Examination of the determinants of the within-cell correlation matrices for each MANOVA performed did not reveal any that was smaller than .046, well above the .0001 cutoff.[5] These results were confirmed by the SMC's calculated between each variable and the linear combination of all other variables within its set. In this analysis the largest SMC was calculated to be .652; again, this is well below the usual .90 level used to define the cutoff for multicollinearity. Multicollinearity and singularity are judged to not be a problem for the MANOVA analyses conducted in this study.

Analyses

For the analyses that follow, it was decided that since this is an exploratory study the alpha level for statistical significance should be relaxed to the .10 level.

[5] Tabachnick and Fidell (1989) suggest that a singularity or multicollinearity problem may exist if the determinant of the within-cell correlation matrix is less than .0001 (p. 380).

Identifying Initial Differences Between the Groups

Two MANOVA's were conducted to determine if any differences existed between the groups at the beginning of the study. The first MANOVA compared the four collaboration groups (CC, CCTT, CCNO, and CoNO), the second MANOVA compared the five groups involved in the study (CC, CCTT, CCNO, CoNO, and NC).[6]

The first MANOVA, after taking all of the pre-measure variables together to account for the covariation between the variables, revealed no significant differences between the four collaboration groups on the pre-measures at the .10 level (Wilks lambda=.346, F=.811, df=24,44, p=.705). The second MANOVA, after taking EF1G, EF1P, OCIW1, ATT1, BEH1, and ACH1 simultaneously to account for the covariation between the variables, revealed no significant differences between the five groups on the pre-measures at the .10 level (Wilks lambda=.590, F=.483, df=24/71, p=.976). Having established that the groups were probably similar at the beginning of the school year it was decided that post-measure group data did *not* need to be adjusted (i.e., through MANCOVA) to compensate for any initial differences between the groups.

Post-Measure Analyses

The first research question was designed to get at the differences between the four collaboration groups on the basis of the post-measure data. The hypothesis to be tested was: of the four collaboration groups, the CC group differs most from the other groups when all the teaching-learning variables are taken at one time. The results of a MANOVA suggest that differences do exist at the .10 level between collaboration groups after taking ITS2T, SBI2, EF2G, EF2P, OCIW2, ACH2, BEH2, ATT2 simultaneously to account for covariation between the

[6]A third MANOVA was conducted on the four collaboration groups to evaluate the effect of using the original ITS1 variable instead of ITS1T (Wilks lambda=.331, F=.853, df=24/44, p=.656). No difference was found between the two analyses.

variables (Wilks lambda=.147, F=1.72, df=24/44, p=.058).[1] To find the nature of these differences it was necessary to conduct a post-hoc analysis using discriminant analysis.

Using ITS2T, SBI2, EF2G, EF2P, OCIW2, ACH2, BEH2, ATT2 as potential predictors, discriminant analysis was carried out. At the .10 level only the first discriminant function was retained ($\chi^2(24)=36.48$, p=.049). This single function accounted for 65.67% of the variance in the data set and resulted in 80.77% correct reclassification into the collaboration groupings. Using structure coefficients, a dimension with pupil attitude at one end and personal teaching efficacy and pupil achievement at the other end is described.[2] As can be seen in Figure 6, plotting the discriminant means (CC mean=2.02, CCTT mean=0.68, CCNO mean=-1.56, and CoNO mean=-0.03) one finds that the: (1) CC group differs most from the other three groups, (2) CCTT group and the CoNO groups are similar to each other but differ from both the CC and the CCNO groups, and (3) CCNO differs from all other groups.

The CC group does seem to stand out when compared to other collaboration groups in the study. Teachers in the CC group exhibited more personal teaching efficacy and pupils in the this group had higher achievement than the teachers and pupils, respectively, in the other collaboration groups. However, pupils in the CC group were also more likely to have more negative attitudes toward: themselves, peers, teacher, school, learning in general, language arts, social studies, and math. Also standing out, when compared to the other collaboration groups, is the CCNO group. Teachers in the CCNO group tended to have lower personal teaching efficacy and lower pupil achievement, however pupils generally had more positive attitudes toward: themselves, peers, teacher, school, learning in general, language arts, social studies, and math.

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[1] A second MANOVA using ITS2 instead of ITS2T produced results almost identical to those reported in the text, for this MANOVA the following statistics were calculated: Wilks lambda=.139, F=1.79, df=24,44, p=.046. Furthermore, in the post-hoc discriminant analysis only the first discriminant function was retained and the factors of EF2P, and ACH2 formed one end of the discriminant dimension, while ATT2 formed the opposite end of the dimension.

[2] Loadings of |.25| or greater were retained for describing the salient characteristics of the dimension.

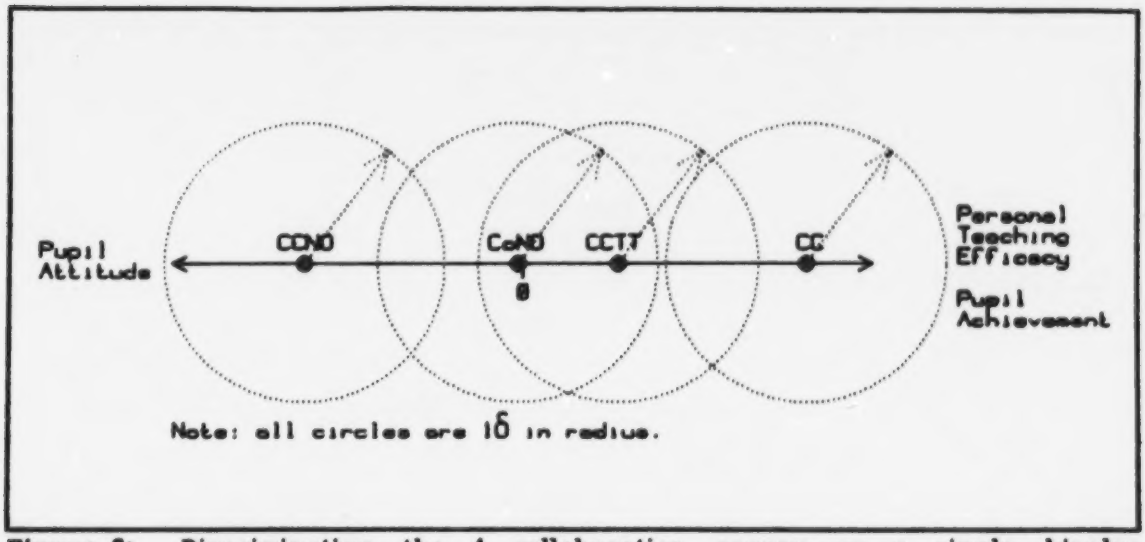

Figure 6: Discriminating the 4 collaboration groups on a single bipolar dimension.

The second research question was designed to get at the differences between the five groups in the study on the basis of the post-measure data. The hypothesis to be tested was: of the five groups, the CC group differs most from the other groups when teacher efficacy and behaviour, and pupil achievement, attitude and behaviour are taken simultaneously. The results of the MANOVA suggest that differences do exist at the .10 level between at least two of the four collaboration groups after taking EF2G, EF2P, OCIW2, ACH2, BEH2, ATT2 simultaneously to account for covariation between the variables (Wilks lambda=.165, F=2.00, df=24/71, p=.013). To find the nature of these differences it is necessary to conduct a post-hoc discriminant analysis.

Using EF2G, EF2P, OCIW2, ACH2, BEH2, ATT2 as potential predictors, a discriminant analysis was computed. At the .10 level only the first discriminant function was retained ($\chi^2(24)=42.29$, p=.012). This single function accounted for 61.86% of the variance in the data set and resulted in 73.33% correct reclassification into the collaboration groupings. Using structure coefficients, a dimension with pupil attitude and teacher behaviour at one pole and personal teaching efficacy and pupil achievement at the other pole is described. As can be seen in Figure 7, plotting the discriminant means (CC mean=1.59, CCTT mean=1.11, CCNO mean=-1.37, CoNO mean=0.28, NC mean=-0.98) one finds that the: (1) CC group is similar to the CCTT group but differs from the other three groups, (2)

CCTT group is similar to the CC and CoNO groups but different from the other two groups, (3) the CoNO group is similar to the CCTT group but differs from all other groups, and (4) CCNO group and the NC group are similar to each other but differ from all other groups.

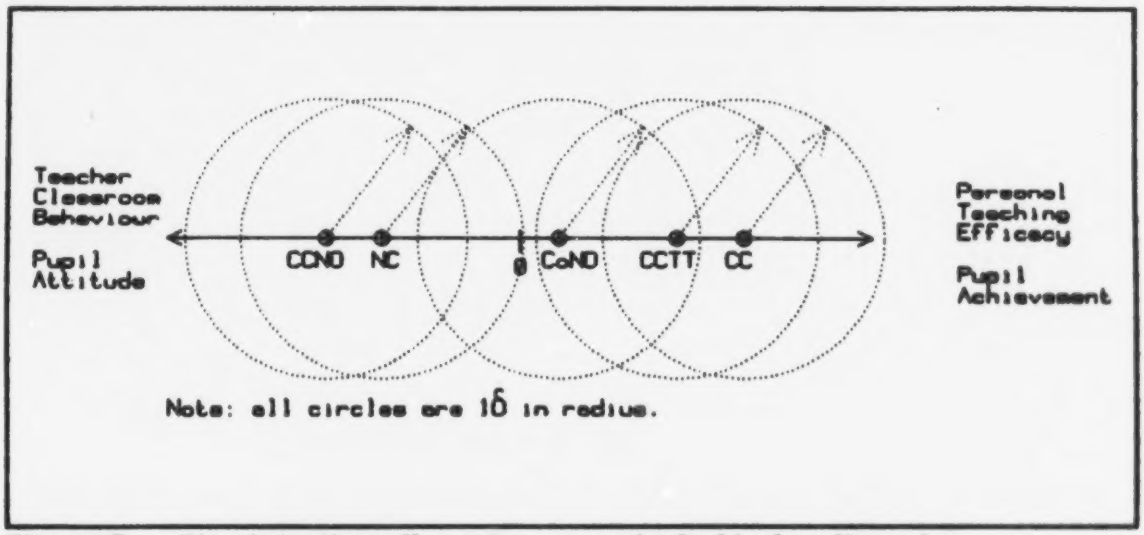

Figure 7: Discriminating all groups on a single bipolar dimension.

The CC group and the CCTT group seem to stand out when compared to other groups in the study. Teachers in the CC and CCTT groups exhibited more personal teaching efficacy and pupils in the this group had higher achievement than the teachers and pupils in the other groups. However, because of the nature of this discriminant function, pupils in the CC and CCTT groups were less likely to perceive their teacher's classroom behaviour positively and they were also more likely to have more negative attitudes toward: themselves, peers, teacher, school, learning in general, language arts, social studies, and math.

The third research question addresses the nature of the links between the first and the second cells of the guiding framework. The research hypothesis to be tested is: strong links exist, after taking into account the covariation between the variables in each set, between the first set of variables--trust for the teaching partner (ITS2T) and the teaching partner's preferred mode of interaction (SBI2)--and the second set of variables--general teaching efficacy (EF2G) and personal teaching efficacy (EF2P).

The results of a C.A. suggest that after accounting for the covariation of the variables within each set of variables, no significant (α=.10) relationship was

found to exist between the variables contained within cell 1 and cell 2 (Wilks lambda=.900, F=.60, df=4/44, p=.667). The canonical correlation between the $\dot{X}^{(1)}$ and the $\dot{Y}^{(1)}$ was only 0.25; put another way, variate $\dot{X}^{(1)}$ explains only 6.3% of the variance in variate $\dot{Y}^{(1)}$ and vice-versa (R^2_{c1}=.063).[1] It does not appear that after accounting for the covariation of the variables within the first cell and within the second cell of the framework, that trust for the teaching partner and the teaching partner's preferred mode of interaction is related to teacher efficacy and teacher reflection.

The fourth research question addresses the nature of the links between the second and the third cells of the guiding framework. The research hypothesis to be tested is: strong links exist between general teaching efficacy (EF2G) and personal teaching efficacy (EF2P), taken together to account for the covariation between the first set of variables, and teacher classroom behaviours (ENTH2, FDB2, INST2, OPP2, PACE2, STRC2, TASK2), taken together to account for the covariation between the second set of variables.

The results of a C.A. suggest that, after accounting for the covariation of the variables within each set of variables, a significant (α=.10) relationship was found to exist between the variables contained within cell 2 and cell 3 (Wilks lambda=.403, F=1.72, df=14/42, p=.087). Dimension reduction analysis indicates that only the first pair of canonical variates was statistically significant at the .10 level (significance of λ_1 is p=.411). The canonical correlation between the $\dot{X}^{(1)}$ and the $\dot{Y}^{(1)}$ is 0.69; variate $\dot{X}^{(1)}$ explains 47.9% of the variance in variate $\dot{Y}^{(1)}$ (R^2_{c1}=.479). Data on the first pair of canonical variates appears in Table 7. The percent of variance and redundancy indicate that the first pair of canonical variates is moderately correlated. Examining the correlations (using a cutoff correlation of .30) between the variables and their respective canonical variate it becomes more clear that the Cell 2 variable correlated with the first canonical variate is EF2G and that the Cell 3 variables correlated with the first canonical variate are ENTH2, FDB2, OPP2, PACE2, STRC2, TASK2. The first pair of canonical variates indicates that those teachers with high degrees of general teaching efficacy (EF2G, .99) also tended to: be more enthusiastic (ENTH2, .54), provide more feedback to pupils (FDB2, .78), ensure that all pupils have the opportunity to

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[1] Results of a C.A. using ITS2 instead of ITS2T produced results almost identical to those reported in the main text (Wilks lambda=.925, F=.44, df=4/44, p=.779).

learn (OPP2, .77), set an appropriate level of difficulty for assignments (PACE2, .42), provide structuring comments (i.e., overviews) (STRC2, .71), and not be task oriented or "businesslike" (TASK2, -.51).

Table 7 Correlations, standardized canonical coefficients, canonical correlations, percents of variance, and redundancies between Cell 2 variables and Cell 3 variables and their corresponding canonical variates.

	First Canonical Variate[a]	
	Structure Coeff.	Std. Coeff.
Cell 2 set--$\dot{X}^{(1)}$		
EF2G	.99	1.01
EF2P	.03	.15
Variance	.48	
Redundancy	.23	
Cell 3 set--$\dot{Y}^{(1)}$		
ENTH2	.54	-.18
FDB2	.78	.50
INST2	.08	-.35
OPP2	.77	.56
PACE2	.41	-.15
STRC2	.71	.35
TASK2	-.51	-.23
Variance	.35	
Redundancy	.17	

[a]For this canonical variate pair R_{cl}=.692 and λ=.479.

The fifth research question addresses the nature of the links between the third and the fourth cells of the guiding framework. The research hypothesis to be tested is: strong links exist between teacher classroom behaviours (ENTH2, FDB2, INST2, OPP2, PACE2, STRC2, TASK2), taken together to account for the covariation between the first set of variables, and pupil outcomes which are behavioural (BEH2), attitudinal (ATT2), and academic (ACH2), taken together to account for the covariation between the second set of variables.

The results of a C.A. suggest that, after accounting for the covariation of the variables within each set of variables, a significant (α=.10) relationship was found to exist between the variables contained within cell 3 and cell 4 (Wilks lambda=.201, F=2.07, df=21/58, p=.015). Dimension reduction analysis indicates that

only the first pair of canonical variates is statistically significant at the .10 level (significance of λ_1 is p=.462). The canonical correlation between the $\dot{X}^{(1)}$ and the $\dot{Y}^{(1)}$ is 0.82; variate $\dot{X}^{(1)}$ explains 66.8% of the variance in variate $\dot{Y}^{(1)}$ (R^2_{cd}=.668). Data on the first pair of canonical variates appears in Table 8. The percent of variance and redundancy indicate that the first pair of canonical variates are moderately correlated. Examining the correlations (using a cutoff correlation of .30) between the variables and their respective canonical variate it becomes more clear that the Cell 2 variables correlated with the first canonical variate are ENTH2, FDB2, OPP2, PACE2, STRC2, and TASK2, and that the Cell 3 variables correlated with the first canonical variate are BEH2, and ATT2. The first pair of canonical variates indicates that those teachers who are enthusiastic (ENTH2, .63), provide more feedback to pupils (FDB2, .73), ensure that all pupils have the opportunity to learn (OPP2, .83), set an appropriate level of difficulty for assignments (PACE2, .67), provide structuring comments (STRC2, .72), are not task oriented (TASK2, -.56) tend to have pupils who are better behaved (BEH2, .48) and have more positive attitudes (ATT2, .99) toward: themselves, peers, teacher, school, learning in general, language arts, social studies, and math.

Discussion

The discussion is divided into three subsections. First, a summary of the findings is presented. Second, implications of the findings are given. And third, recommendations are offered regarding the findings.

Table 8 Correlations, standardized canonical coefficients, canonical correlations, percents of variance, and redundancies between Cell 3 variables and Cell 4 variables and their corresponding canonical variates.

	First Canonical Variate[a]	
	Structure Coeff.	Std. Coeff.
Cell 3 set--$\dot{X}^{(1)}$		
ENTH2	.63	.18
FDB2	.73	-.50
INST2	.16	.35
OPP2	.83	-.56
PACE2	.67	.15
STRC2	.72	-.35
TASK2	-.56	.23
Variance	.42	
Redundancy	.28	
Cell 4 set--$\dot{Y}^{(1)}$		
ACH2	.25	.13
BEH2	.48	-.01
ATT2	.99	.98
Variance	.42	
Redundancy	.28	

[a]For this canonical variate pair R_{cl}=.817 and λ=.668.

Summary of Findings

This subsection deals with three issues. First, is a summary of the difficulties encountered in measuring reflection. Second. is a summary of how the research questions were answered. Third, is a summary of how the general research question was answered.

Measures of Reflection

The evidence collected in this study vis-a-vis audio-taped conferences between teachers and their respective teaching partners did not, with the exception of one instance during a CC group dyad conference, result in any discussions being termed "reflective." Regardless of group membership, the vast

majority of conference discussions between teachers and their respective teaching partners were of a "thoughtful" nature.

Responding to the Research Questions

In response to question 1: the teaching-learning variables, taken together, do distinguish between the groups using different collaboration strategies along a bi-polar dimension defined by pupil attitudes at one pole and personal teaching efficacy and pupil achievement at the other pole. When compared to the other collaboration groups, teachers in the CC group exhibited higher levels of personal teaching efficacy while pupils in the this group had higher achievement; however, pupils in this CC group were also more likely to have poorer attitudes toward: themselves, peers, teacher, school, learning in general, language arts, social studies, and math. Interestingly, the CCNO group pupils exhibited the most positive attitudes while having the most negative achievement and the CCNO group teachers exhibited the lowest personal teaching efficacies of the four groups.

In response to question 2: the teaching-learning variables of teacher efficacy, teacher behaviour, pupil achievement, pupil attitude, and pupil behaviour do distinguish between the five groups in the study along a bi-polar dimension defined by pupil attitudes and teacher behaviour at one pole and personal teaching efficacy and pupil achievement at the other pole. Relative to the CCNO, CoNO, and the NC groups, the CC group and the CCTT group teachers were most likely to have higher personal teaching efficacy and pupils with higher achievement; however, the same teachers were also perceived by pupils as exhibiting less desirable classroom behaviour, the pupils also had poorer attitudes generally. Relative to the CC, CCTT, and CoNO groups, the CCNO group and the NC group teachers were most likely to have lower personal teaching efficacy and pupils with lower achievement; however, the same teachers were also perceived by pupils as exhibiting more desirable classroom behaviour, the pupils also had better attitudes generally.

In response to question 3: after accounting for the covariation of the variables within the first cell and within the second cell of the framework, trust for the teaching partner and the teaching partner's preferred mode of interaction were not found to be related to teacher efficacy and teacher reflection.

In response to question 4: after accounting for the covariation of the variables within the second cell and within the third cell of the framework, one moderately strong link exists between teacher reflection and teacher efficacy--taken together, and teacher classroom behaviours--taken together. This link suggests that those teachers with high degrees of general teaching efficacy were associated with the following pupil perceived classroom behaviours, they: were more enthusiastic, provide more feedback to pupils, ensure that all pupils have the opportunity to learn, set an appropriate level of difficulty for assignments, provide structuring comments (i.e., overviews), were not task oriented.

In response to question 5: after accounting for the covariation of the variables within the third cell and fourth cell of the framework, one moderately strong link exists between teacher classroom behaviours, and pupil outcomes. This link suggests that those teachers who were more enthusiastic, provided more feedback to pupils, ensured that all pupils have the opportunity to learn, set an appropriate level of difficulty for assignments, provided structuring comments (i.e., overviews), and were not task oriented tended to be associated with pupils who had more positive attitudes--toward themselves, their peers, their teacher, school, learning in general, language arts, social studies, and math--and were better behaved.

General Research Question

The evidence collected suggests that teacher participation in various collaboration programs is associated with differing teaching-learning outcomes. Two collaboration strategies stand out on the basis of the evidence collected for this study. The CC group differs most from the other collaboration groups in terms of: (1) teachers having a higher degree personal teacher efficacy, (2) higher pupil achievement, and (3) more negative pupil attitudes. When all groups were compared, the CC group and the CCTT group differed most from the other groups in terms of: (1) teachers having a higher degree of personal teaching efficacy, (2) more positive pupil achievement, and (3) more negative pupil attitudes. Furthermore, when the four collaboration groups were simultaneously compared with the non-collaboration group the CC, CCTT and the CoNO groups were considerably different from the NC and CCNO groups in the terms just described. The NC and CCNO groups were most similar to each other and differed

from the other groups in terms of: (1) teachers having a lower degree personal teacher efficacy, (2) lower pupil achievement, (3) more positive pupil attitudes, and (4) more positive teacher classroom behaviours.

Implications

The problem encountered in the measurement of reflection was not anticipated as a result of the review of the literature regarding reflective thought. In terms of the guiding framework, although empirical data is still lacking regarding the nature of the links between teacher reflection and the variables surrounding it in cells 1, 2, and 3, it is still defensible to include reflection as part of the framework in cell 2 on the basis of previous research (e.g., Cruickshank and Applegate, 1981; McCoombe, 1984; Robinson, 1984). On the basis of Cruickshank and Applegate (1981), McCoombe (1984), and Robinson (1984) it can be argued that teacher efficacy can act as a proxy variable for teacher reflection. However, it is unknown whether teacher reflection is most related to personal teaching efficacy or general teaching efficacy.

The main difficulty in this study with the measurement of teacher reflection lies in the "place" in which it was sought, namely: the conference between the teacher and teaching partner. Although nothing precludes teacher reflection from occurring during a teacher/teaching partner conference it does not appear that teacher reflection occurs with any great frequency during this time. It is unlikely that 26 teachers in the four collaboration groups could not, with one exception, be reflective regarding their teaching. A more likely explanation of this phenomenon is that teachers were reflective after conferencing with their respective teaching partners. As Garman (1984), Elliot (1976), and Zimpher and Howey (1987) suggest, it is possible to amplify the degree of teacher reflection through the use of suitable self-monitoring techniques and teacher consultation practices. These techniques and practices may serve to "plant the seed" which later initiates reflective thought. That evidence of reflective thought was not found in conferences between teachers and their teaching partners in no way diminishes the usefulness of conferencing for, among other things, stimulating reflection.

A number of interesting observations can be made as a result of the statistical analyses conducted to answer the questions posed. It is interesting to

note that all discriminant analyses resulted in at least one discriminant function describing a bi-polar continuum composed of personal teaching efficacy and pupil achievement at one pole and pupil attitudes at opposite pole[18] on which the groups were discriminated. The expectation, as a result of the literature reviewed (e.g., Acheson and Gall, 1992; Little, 1987), would have been to observe pupil attitudes and pupil achievement coalesce at one end of the continuum rather than an opposite ends of the same continuum as found here. This suggests that high achieving pupils generally have more negative attitudes towards attitudinal objects associated with school. A second point regarding this continuum can be made involving the relationship between personal teaching efficacy and pupil achievement. Several studies suggest that a negative relationship exists between teaching efficacy and pupil achievement (e.g., Armor *et al.*, 1976; Ashton, 1985; Berman *et al.*, 1977) Cavers (1988), however, found no evidence of such a relationship. And, Ashton and Webb (1986) concluded that their findings "strongly support the hypothesis that teachers' sense of efficacy is related to student achievement" (p. 139). This study suggests that: (1) a positive relationship does indeed exist between personal teaching efficacy and pupil achievement, and (2) a negative relationship exists between personal teaching efficacy and pupil attitudes toward school related attitudinal objects.

A puzzling finding was the general trend of the positioning of the various groups relative to each other in the discriminant space comprised of personal teaching efficacy and pupil achievement at one extreme and pupil attitudes at the other extreme as seen in Figures 6 and 7. Because of the method in which the groups were defined, the expectation was that if groups were going to cluster they would do so according to the following criteria: (1) collaboration groups would separate from the non-collaboration group, and (2) collaboration groups utilizing direct classroom observation would separate from collaboration groups not utilizing direct classroom observation. As seen in Figures 6 and 7 the general trend is for the CC group and the CCTT group to be positioned side by side as expected; however, the separation of the CCNO group and the CoNO group was not expected (see Figure 6), nor was the clustering of the CCNO group with the NC group (see Figure 7). One possible explanation for this unexpected

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[18]Note that for research question 2, the pole with pupil attitude also contained teacher behaviour.

phenomenon is that the conferences held by the CCNO group teachers with their teaching partners may have been so informal and lacking in specific direction that essentially these teachers were not gaining anything substantially different from what the NC group teachers obtained from casual "lunch-room" type conversations with peers.

The results of the C.A.'s performed on the pairs of cells of the guiding framework also revealed three interesting points. Each of these are addressed below.

The lack of relationship between cell 1 and cell 2 does seem to contradict many authors (e.g., Cogan, 1973; Goldhammer, et al., 1980; Lovell and Wiles, 1983; Acheson and Gall, 1992; Grimmett and Erickson, 1988; Sergiovanni and Starratt, 1993) who suggest that: (1) the development and maintenance of teacher trust and professional respect for the teaching-partner is imperative, and (2) teachers should be treated as competent professionals who are accountable for their professional performance and in control of their professional development--in other words, calling for supervisory interaction that is not directive. However, a cursory examination of the frequency distributions for teacher trust for the teaching partner (ITS2T) and the teaching partner's supervisory beliefs (SBI2) reveals that a ceiling effect may have been reached in measuring both of these variables. In retrospect, the lack of association should have been expected given the circumstances under which the groups of teachers were formed. All teachers in the collaboration groups choose their own partners--presumably people who were already trusted and respected professionally by the teachers--it is unlikely that any teacher would choose to collaborate with someone who was not trusted. It is also unlikely that teachers, particularly experienced teachers, would willingly choose to collaborate with someone who would be directive during a teacher/teaching partner conference. It is possible that if some of the teachers had been assigned a teaching partner with whom to work, that the increased variability in SBI2 and ITS2T may have resulted in obtaining a significant relationship between cell 1 and cell 2. In the present study the variables in cell 1 appear to be pre-conditions met to a very large degree by all teachers in the four collaboration groups.

Although the literature suggests that teaching efficacy is related to teacher behaviours it was surprising to find that general teaching efficacy, rather than personal teaching efficacy, was positively related to teacher classroom behaviours

such as: feedback to pupils, the opportunity for pupils to learn new subject-matter, providing structuring comments (i.e., lesson overviews), teacher enthusiasm, and lesson pacing. Yet, general teaching efficacy was found to be negatively related to the teacher behaviour of "task orientation" (i.e., the extent to which the classroom is business-like). This negative relationship may be due to the grade levels of the pupils--elementary--forming the sample in this study.

The relationship found to exist between cell 3 and 4 also proved to be slightly different from the original expectations. Pupil attitudes and behaviour were found to be moderately positively related to teacher behaviours such as:

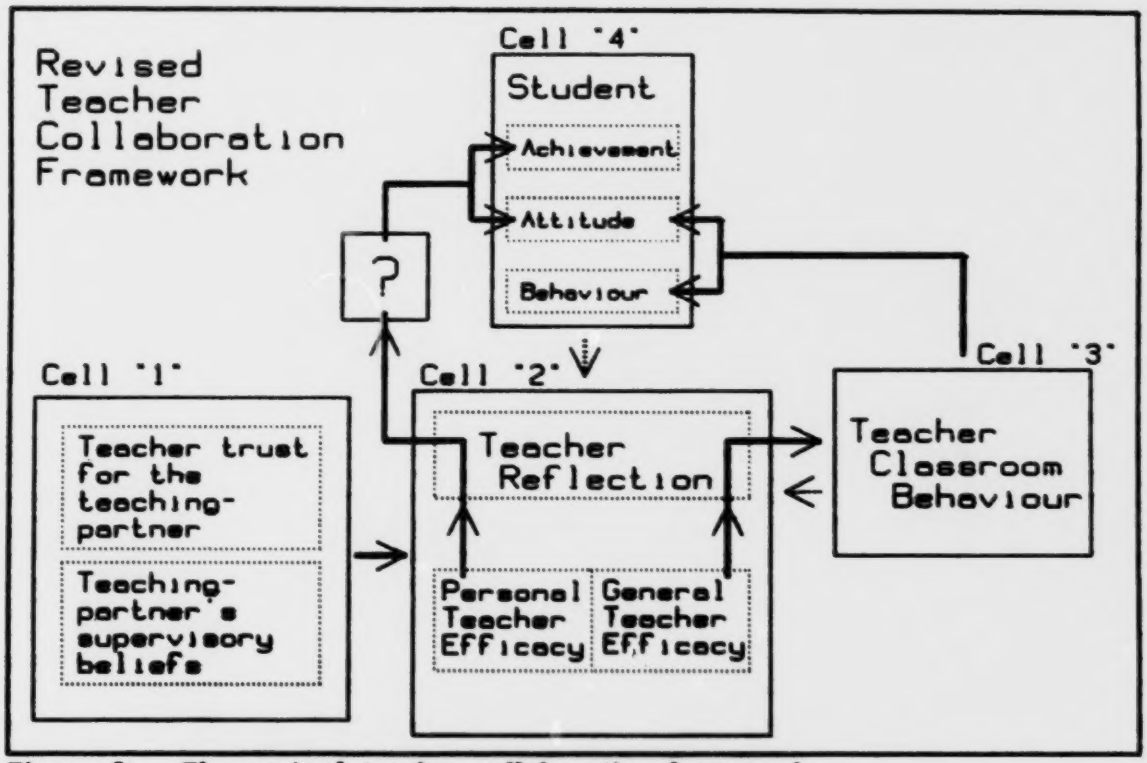

Figure 8: The revised teacher collaboration framework.

feedback to pupils, the opportunity for pupils to learn new subject-matter, providing structuring comments, teacher enthusiasm, and lesson pacing. While teacher task orientation was found to be moderately negatively related to pupil attitudes and achievement--again, this negative relationship may be due to the grade level of the pupils in the sample. What differed from the original expectation was that pupil achievement was not found to be related to teacher

behaviours. In light of the present findings, it appears that three general modifications should be made to the guiding framework (see Figure 8). First, in cell 2, teacher efficacy should be split into its two main components of personal teaching efficacy and general teaching efficacy. Second, general teaching efficacy should, through teacher reflection, be linked to cell 3, teacher classroom behaviour. Cell 3 should, in turn, be linked to pupil behaviour and pupil attitude. Third, personal teaching efficacy should, through teacher reflection, be linked to pupil achievement and to pupil attitude--recall that the latter is a negative relationship. This link, however, is unclear as to the intermediary step, or steps, between the teacher and the pupil (i.e., how does the teacher viz personal teaching efficacy affect pupils).

Also important, but straying from the theme of this paper, the lack of relationship between pupil achievement and teacher behaviours suggests that summative evaluation of teachers based on the notion that teachers who behave in certain ways in the classroom will cause increased pupil achievement is not founded. This finding does, however, suggest that certain teacher behaviours are associated with more positive pupil attitudes and behaviours.

Recommendations

Four recommendations emerge from this study. First, future research in the area of teacher reflection should address two problems. The first problem is concerned with determining when teacher reflection occurs. The second problem is concerned with developing a method of quantifying reflection without inadvertently changing the "amount" or "quality" of reflection (i.e., by having teachers keep a journal). Second, the nature of the linkages between cell 1 and cell 2 of the framework should be investigated further, perhaps by assigning teaching partners and teachers to work together so that teacher trust for the teaching partner and the teaching partner's supervisory beliefs are more variable. Third, school administrators using pupil achievement for judging teacher performance should reconsider the relevance of such measures. The opposite side of this "coin" appears to suggest that the commonly accepted linkage between teacher behaviour and pupil achievement should be suspected. Fourth, the call is made for further testing the feasibility of the guiding framework developed and later revised in this study. In particular, the function of teacher reflection in

the relationship between and among personal teaching efficacy, pupil achievement and pupil attitude needs to be better understood. Similarly, the function of teacher reflection in the relationship between and among general teaching efficacy, teacher behaviour, pupil attitude, and pupil behaviour needs to be better understood. Furthermore, if personal teacher efficacy is not related to teacher behaviour, future research should investigate what links this construct positively with pupil achievement and negatively with pupil attitudes. This is not to say that the framework should be carved into smaller parts and tested fragment by fragment. This fragmentation is precisely what was being avoided in this study by attempting to test the "whole" framework simultaneously through the use of multivariate statistical techniques.

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Appendix A
Description of Terms Used

The descriptions that follow are provided to inform the reader how "key" terms are used in the context of this study. These descriptions are based on the literature reviewed.

Clinical supervision. This refers to the partnership described by Cogan (1973) and Goldhammer *et al.* (1980) between supervisor and teacher which uses classroom data as the basis for subsequent analyses whose purpose is to improve the teacher's classroom practices, for formative purposes only, in ways that make sense to the teacher. The supervisor's job is not to identify what is "right" or "wrong" with the teacher's teaching, but to help the teacher identify appropriate goals for improvement. The teacher's role is to decide the focus the clinical supervision process and the direction in which it will proceed.

Collegial consultation. This refers to a process intended to facilitate teacher development using the principles of Cogan's (1973) "clinical supervision." This is a professional relationship between a teacher and another individual (e.g., vice-principal, principal) within the school or school district. The relationship is not a reciprocal one, the two people forming the dyad do not exchange roles. Collegial consultation is seen as a special case of the more general case clinical supervision. In this study, collegial consultation dyads did not use direct observation of classroom events. Data for conferencing were obtained from the teacher's recollection of past events.

Collaborative consultation. This refers to a process intended to facilitate teacher development using the principles of Cogan's (1973) "clinical supervision." Underpinning this process exists a non-hierarchical relationship between a teacher and a teaching-partner characterized by mutual trust and respect which is presumed to provide a supportive environment in which the teacher can evaluate previous teaching strategies, as well as implement and evaluate new strategies. It is a reciprocal (exchange teacher and teaching-partner roles) relationship of equals in which both partners wish to engage (Nolan, 1989). Collaborative consultation is seen as a special case of the more general case collegial consultation.

Collaborative consultation without direct observation. This is similar to collaborative consultation as defined above except that the classroom observation phase, as described by Cogan (1973), used to collect "objective" data is not implemented; instead, data for conferencing are obtained from the teacher's recollection of past events.

Teacher collaboration. This is used here as a generic term for the varying terminologies used by different authors when referring to teachers working with other individuals for formative purposes. (e.g., Little's (1987) collegial consultation, Glickman's (1990) developmental supervision, Sergiovanni and Starratt's (1993) human resources supervision, Grimmett and Crehan's (in progress) collaborative consultation).

Directive mode of interaction. This refers to a conferencing approach used by a teaching partner based on the belief that teaching consists of technical skills with known standards and competencies for all teachers to be effective. The teaching partner's role is to inform, direct, model, and assess those competencies. Conferences between teachers and teaching-partners conducted in this mode exhibit high teaching-partner control and low teacher control (Glickman, 1990, p. 92).

Pre- and post-measures. It is recognized that this pair of terms is typically refers to the measures obtained during the periods immediately before and following researcher intervention--e.g., pre- post-test experimental and quasi-experimental studies; although there was no researcher intervention in this study, these terms are used here in reference to the measures obtained at the beginning and the end, respectively, of the 1991-1992 school year.

Reflection. This is an activity which draws on experiencing, remembering, believing, reasoning, knowing, perceiving, and feeling, as needed, to bear on a ". . . directly experienced situation which [is] puzzl[ing] or surpris[ing] (Grimmett and Erickson, 1988, p. 6) to construct a reality. From this construction of a "reality," hypotheses can be derived and tested logically; afterwards the "best" hypotheses can be tested by overt action. Reflection is

distinct from thoughtfulness in that the latter does not require one to draw on past experience and internal history nor does it require the formation or logical testing of hypotheses; thoughtfulness involves thinking about what just happened and deciding what should be done.

Pupil academic achievement. This refers to ". . . the reaching of a specific quantity or quality level by an individual" (Dejnoska and Kapel, 1982, p.8). Pupil academic achievement is referred to more simply in this study as "achievement." Overall achievement for each pupil was obtained by averaging teacher assigned grades in language arts, math, science and social studies.

Pupil attitude. This refers to an affective, evaluative disposition manifested by a person towards a psychological object. Six attitudinal objects of interest are identified in the literature, namely: (1) self; (2) peers; (3) the classroom teacher; (4) the school; (5) various school subjects; and, (6) learning in general.

Pupil behaviour. Pupil behaviour refers to the manner in which pupils interact with each other and with adults while in the charge of the classroom teacher or an assignee of the classroom teacher (e.g., a pupil is sent to the library to work with the librarian on an individual research project). Also included is behaviour exhibited by pupils who are supposed to be in the charge of the classroom teacher, but have manipulated the "system" allowing them to be elsewhere under false pretences (e.g., a pupil is released from school on the basis of a forged "note from home").

Supervision. This refers to a formative process in which a teacher, working with a teaching-partner, decreases the discrepancy between perceived teaching behavior and desired teaching behavior.

Teacher efficacy. This refers to a construct with two components: (1) teaching efficacy, and (2) personal teaching efficacy. Efficacy is defined in the Gage Canadian Dictionary as "the power to produce a desired effect or result" (1973, p. 371). Applied to teaching, Gibson and Dembo (1984) identify two facets of teaching efficacy: (1) teaching efficacy is the belief that any teacher's ability to bring about change is limited by factors external to the teacher, and (2) personal teaching efficacy is described as the belief that the individual teacher has the skills and abilities to bring about pupil learning.

Teaching-partner. This refers to a trusted and respected colleague who, acting on behalf of a teacher, collects classroom data then shares the data with the teacher in a nonjudgemental and noncritical way so that the teacher can engage in pedagogic reflection and self-evaluation. This individual *does not* occupy a hierarchically superior position whose role is to collect data for the purpose of teacher evaluation.

Trust. This refers to a person's general expectation that in a risk-taking situation the words, spoken or written, or actions of another individual will be in the best interest of the former (Wheeless and Grotz, 1977).

Appendix B
Data Collection: Instruments and Procedures

This appendix first describes the instruments used to collect the data for the study. It then goes on to describe the procedures used to collect the data.

Instruments

Teacher Trust for Teaching Partner

To measure teacher trust for the teaching partner, Wheeless and Grotz's (1977) Individualized Trust Scale (ITS) was administered. This is a unidimensional scale measuring one's trust for another specific individual. The scale consists of 15 semantic differential-type, 7 interval items with the positive-negative polarities randomly ordered to avoid response bias.[11] Wheeless and Grotz (1977) report a split-half reliability coefficient of 0.92 when the scale was administered to 100 teachers and their spouses or oldest child (n = 261) (p. 254).

Teaching Partner's Supervisory Beliefs

Determination of the teaching partner's supervisory beliefs was done primarily through Glickman and Tamashiro's (1981) Supervisor Beliefs Inventory (SBI) (cited in Glickman, 1990, pp. 88-91). Related to the three philosophical platforms described by Glickman and Tamashiro (1980), and elaborated upon in the previous chapter, are three preferred modes of interaction between a teacher and a teaching partner, namely:

> *Directive* . . . is an approach based on the belief that teaching consists of technical skills with known standards and competencies for all teachers to be effective. The supervisor's role is to inform, direct, model, and assess those competencies.
>
> *Collaborative* . . . is based on the belief that teaching is primarily problem solving, whereby two or more persons jointly pose hypotheses to a problem, experiment, and implement those teaching strategies that appear to be most relevant in their own surroundings. The supervisor's role is to guide the problem-solving process, be an active member of the interaction, and keep the teacher(s) focused on their common problems.
>
> *Non-directive* . . . has as its premise that learning is primarily a private experience in which individuals must come up with their own solutions to

---

[11]The 15 item pairs were: trustworthy/untrustworthy, distrustful of this person/trustful of this person, confidential/divulging, exploitive/benevolent, dangerous/safe, candid/deceptive, deceitful/not deceitful, straightforward/tricky, disrespectful/ respectful, considerate/inconsiderate, dishonest/honest, reliable/unreliable, faithful/unfaithful, insincere/sincere, careful/careless.

> improving the classroom experience for students. The supervisor's role is to listen, be non-judgemental, and provide self-awareness and clarification experiences for teachers (p. 76, italics in original).

Glickman (1990) asserts that individuals do not subscribe to purely any one mode of interaction, he states:

> . . . we rarely find a pure ideological position. . . . [p]erhaps our beliefs are mainly essentialist and directive, yet contain parts of experimentalism and collaboration. . . (p. 92).

The purpose of Glickman and Tamashiro's SBI is to estimate the combination of philosophical beliefs held by a teaching partner when working with a teacher.

The SBI consists of 15 items, each with two choices, labelled "A" and "B," from which to select. The inventory taker is instructed to select the choice that most closely reflects how he or she feels, even though he or she may not agree completely with either choice. In reviewing the literature, reliability measures were not found for the SBI. The author does state that ". . . the instrument has been field-tested six times with ninety supervisors and supervisor trainees. Response between the options indicated `good' item discrimination" (Glickman, 1990, p. 91).

Teacher Reflection

MacKinnon (1985, 1986) has developed a framework for identifying the reflective statements made by pre-service teachers during supervisor-teacher conferences. MacKinnon merged problem setting, developed by Schön, and the developmental conception of teacher concerns, advanced by Fuller and Bown (1975 cited in MacKinnon, 1985), to construct a cycle consisting of three phases: (1) initial problem setting; (2) problem reframing; and, (3) problem resolution.

For the purpose of this study, the reflective cycle is seen as transpiring within a segment of discussion dedicated to a specific topic between the teacher and the teaching partner. Audio-taped conferences between teachers and their respective teaching-partners were coded to identify instances of reflection. Combining MacKinnon's reflective phases with the definition of reflection used in this study, three points were developed to code each segment of discussion, namely:

(1) identification of a perplexing or surprising event or condition--a problem,

(2) relating past experience to the current problem to reformulate the problem,

(3) deriving hypotheses and testing them logically.

Using these points as the basis for a coding system, all conferences were coded with respect to teacher reflection (the procedure is described in more detail below.

Teacher Efficacy

Gibson and Dembo (1984) developed a 30-item, six interval Likert-type, teacher efficacy scale which, through a factor analysis, yielded two factors: teaching efficacy, and personal teaching efficacy. These were in line with Bandura's (1977) dual faceted model of teacher efficacy and with Ashton *et al's.* (1983) teacher efficacy model. Through statistical analysis, Gibson and Dembo (1984) found that only 16 of the 30 items in their scale exhibited acceptable reliability coefficients. Gibson and Dembo (1984) report the following Cronbach's alpha coefficients for the 16 item teacher efficacy scale: (1) 0.78 for the personal teaching dimension, 0.75 for the general teaching dimension. These findings are supported by Anderson *et al.* (1987), who reported similar findings to Gibson and Dembo (1984). In their own study, analysis was only done on the items yielding acceptable reliability coefficients (Gibson and Dembo, 1984).

For this study, the differentiation between general teaching efficacy and personal teaching efficacy was maintained. Gibson and Dembo's (1984) 16 item Teacher Efficacy Scale was administered to all teachers. For interpretation purposes, it should also be noted that a number of authors have found significant positive correlations between teacher efficacy and teacher gender with females being more efficacious than males (e.g., Anderson *et al.*, 1987; Cavers, 1988; Evans and Tribble, 1986).

Teacher Classroom Behaviour

The technique used in this study to collect data for establishing teacher classroom behaviour, described in detail by Acheson and Gall (1992), was the pupil administered check-list. Eash *et al.* (1980a, 1980b, 1989) and Eash and Waxman (1983a) have developed and refined an instrument specifically for ". . .

gathering student perceptions of teachers' classroom behaviour . . ." (Eash et al. 1989, p. 6). The instrument, referred to as "Our Class and Its Work" (OCIW) consists of forty items describing teaching behaviours which form eight Likert-type sub-scales, namely: didactic instruction, enthusiasm, feedback, instructional time, opportunity to learn, pacing, structuring comments, and task orientation. Because of the current emphasis on cooperative eduction in British Columbia's elementary schools, it was decided that the didactic instruction sub-scale would not be used in this study.

High reliabilities for the eight scales are reported; Cronbach alphas range from 0.84 to 0.92 (Eash, *et al.*. 1989). The OCIW scale has been successfully administered to pupils from grades three to 12. The reliability coefficients stated above were obtained after administering the scale to 762 pupils in grades 4 and 6 in a large American city school district (Eash and Waxman, 1983b, pp. 4-5).

Pupil Achievement

A case can be made for utilizing both standardized achievement tests and teacher assessment for establishing reliable and valid measures of pupil achievement. However, in the interest of making this study possible, compromises had to be made--especially regarding the use of standardized testing. All of the teachers in the first three schools approached in District "A" refused to participate in the study. In a letter from one school explaining why this was the case, the principal stated that:

> Their [the teachers'] decision of non-participation . . . is based upon . . . a strong philosophical opposition to any form of standardized testing.

Informal conversations with the principals of the two other schools echoed this as the primary reason for refusal to participate in the study. Consequently, it was decided not to use standardized achievement testing as one of the measures of pupil achievement in this study. Instead, this study relies entirely on the teachers' anecdotal, and for 18 of the 30 classes--anecdotal and letter graded report cards of pupil progress.

Two report cards of pupil progress are used in this study. The first report issued in both districts approximately the middle of November, 1991 was used as the pre-measure. The final report card, issued at the end of June 1992, was used as the post-measure.

Pupil Attitudes

Pupil attitudes data were collected using Randhawa and Van Hesteren's (1982, 1983) School Attitude Scales for Children (SASC). Randhawa and Van Hesteren (1982) describe the SASC as a series of:

> . . . semantic differential scales which tap the following school-related dimensions: School, Teachers, Arithmetic, Science, Social Studies, Language Arts, Music, Drama, French, Art, Dance, Religion, Health, and Physical Education (p. 6).

The scales are constructed such that the top of each scale has the phrase "Please indicate the degree to which you feel each pair of adjectives applies to . . ." followed by the school related dimension of interest (e.g., school, arithmetic, language arts.) This phrase is followed by ten evaluative bi-polar adjectives pairs with five intervals from which to select.[12] The intervals, from left to right, are labeled: very much, a bit, neither, a bit, and very much.

The original SASC were administered to 99 (55 males and 44 females) pupils in grades three to six from two schools in a mid-western Canadian city (Randhawa and Van Hesteren, 1982, p. 5). The authors report that reliability coefficients for all the scales, except religion, were over 0.80 (Randhawa and Van Hesteren, 1982, p. 8). In a 1983 report utilizing the same sample, Randhawa and Van Hesteren state that reliability for SASC scales dealing with School, Language Arts, Teachers, and Arithmetic were in the 0.89 to 0.92 range for the pre-test measures and in the 0.95 to 0.97 range for the post-measures (p. 7).

For the present study, four of Randhawa and Van Hesteren's SASC scale school related dimensions were used: school, social studies, language arts, and arithmetic. These satisfied two of the six categories revealed by the pupil attitude literature as being important. In addition to these, four other SASC scales were created for this study to obtain measures of what the literature suggests are important objects of attitudinal measure, namely: yourself, your classmates, your regular teacher, and learning in general.

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[12]The ten bi-polar adjective pairs are: kind/cruel, clean/dirty, bad/good, sad/happy, beautiful/ugly, dishonest/honest, strong/weak, unfair/fair, interesting/boring, awful/nice.

Pupil Behaviour

Pupil behaviour data were collected using report card data. Behaviour data from teachers' anecdotal notes on report cards of pupil progress were used. For 18 of the 30 classes, in addition to the teachers' anecdotal notes, report cards also indicated a behaviour grade. For those schools which do not issue a behaviour grade, pupil report cards were read by three elementary level teachers; each teacher assigned a behaviour grade for each pupil report card.[13] These behaviour grades were then averaged to obtain an overall behaviour grade.

Once again, the November 1991 and the June 1992 report cards were used as pre- and post-measures respectively. This is probably the best source of behaviour data since the teacher has the greatest amount of contact with the pupil.

Procedures Used

Gaining Access

To gain access to teachers involved in the types of professional relationships of interest for this study, a series of steps were taken before any teachers were solicited for participation in the study. These are elaborated below.

The British Columbia Teachers' Federation (BCTF), was contacted. This was considered prudent since some of the teacher and teaching partners potentially participating in this study would also be involved in the Program for Quality Teaching (PQT), a program in which the focus is teacher collaboration--collaborative consultation. The BCTF representative in charge of the PQT program suggested contacting two lower mainland school districts which potentially had greater numbers of teachers practicing collaborative consultation than other districts. These two districts were contacted to make arrangements to present the research proposal. After gaining approval at the central office level in each

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[13]The teachers were told to assign behaviour grades using the following three point scale: "good or excellent" behaviour was assigned a "2," "satisfactory" behaviour was assigned a "1," and "poor" behaviour or behaviour "needing improvement" was assigned a "0." Interrater reliability (split-half reliability coefficient) for the pre and post-measures were 0.91 and 0.88 respectively.

district, all of the principals of the schools within the districts having classes in the primary-four to the intermediate-four range were contacted (24 schools in district "A" and 26 schools in district "B"). This often led to a presentation to the teachers of the school by either the researcher or the principal. Teachers then made contact with the researcher if they wished to participate in the study. These teachers were provided with further information and classroom visits for classroom observation and pupil questionnaire administration were scheduled.[14] All questionnaire administration times for the pre-measures were scheduled within four weeks of this meeting (late September and October, 1991).

Data Collection

Data were collected in two phases corresponding to the pre-measures and the post-measures; the questionnaires and procedures used were the same for both phases. Except as noted below for the teacher-teaching partner conference audio recordings, no difficulties were experienced in collecting any data. Data collection will be elaborated upon below in three parts: teacher questionnaires and audio recordings, classroom observation, pupil questionnaires and report cards.

Teacher questionnaires and audio recordings. Instructions for completing the consent forms and questionnaires were presented to the teachers by the researcher. Directions for completing the teaching partner forms and questionnaire were explained to most teachers whose role would also include that of teaching partner. In those instances in which the researcher did not have direct contact with the teaching partner, the teacher was asked to pass the information onto his or her respective teaching partner. Questionnaires and demographic data forms were completed by teachers and teaching partners at their convenience. All teacher and teaching partner pre-measure questionnaires

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[14]Each teacher was provided with a package containing: (1) a teacher consent form, (2) a teacher demographic information form, (3) a Teacher Efficacy scale, (4) an Individualized Trust Scale, (5) a teaching partner consent form, (6) a teaching partner demographic information form, (7) an Supervisory Beliefs Inventory, (8) a labeled audio tape, (9) 35 parental consent forms, and (10) 35 pupil consent forms. Each package contained four bundles of materials: one for the teacher (items 1 to 4), one for the teaching partner (items 5 to 7), one for the teacher and the teaching partner (item 8), and one for the pupils and their parents (items 9 and 10). For those teachers who did not work with a teaching partner, items 4, 5, 6, 7, and 8 were removed from the packages.

were picked up by the researcher on the day on which pupil questionnaires and observations were done. Descriptions of the protocols used for obtaining teacher and teaching partner data are detailed below.

The protocol for administering the ITS in this study consisted of giving a copy of the scale to the teacher and then telling him or her to consider his or her relationship with the teaching partner when considering each pair of terms on the scale. Each teacher was asked to place an "X" between the two terms in the space best describing the professional relationship between the teacher and the teaching partner. Having listened to the instructions and looked at the scale, teachers were given the opportunity to ask questions to remove any ambiguity about what was expected of them. The scales were completed in private at the convenience of the teacher, and returned directly to the researcher in an envelope.

The protocol for administering the Teacher Efficacy scale consisted of giving a copy of the scale to the teacher and telling him or her to consider each of the 16 statements then circle a number from one (corresponding to strongly agree with the statement) to six (corresponding to strongly disagreeing with the statement). Having listened to the instructions and looked at the scale, teachers were given the opportunity to ask questions to remove any ambiguity about what was expected. The scales were completed in private at the convenience of the teacher, and returned directly to the researcher in an envelope.

Since the researcher anticipated not making direct contact with all teaching partners the following description of the SBI was given to teachers to communicate to their teaching partners: "The SBI is a scale designed to get at a person's preferred mode of interaction when working with another teacher." The instructions printed at the top of the SBI read:

> *Please circle either "A" or "B" for each item. You may not completely agree with either choice, but choose the one that is closest to how you feel* (italics in original).

Because this inventory was originally designed for measuring the beliefs of "supervisors" in hierarchically superior positions to those of teachers, some items assume that the inventory taker is in a position of authority. For this reason, teachers were instructed to tell their teaching partners to imagine that they possessed the necessary district authority for making choices when working with another teacher (e.g., determining the need for an inservice workshop, deciding who should participate in a workshop). Of the 26 SBI's distributed for the pre-

measure phase and the post-measure phase, all were completed and returned to the researcher. However, four teaching partners did write on their SBI's comments similar to the following: "The scale assumes I am a supervisor, I do not have authority to make these kinds of decisions."

Teachers were also instructed on the use of the audio tape. They were asked to record a conference with their teaching partner in which the focus was pedagogically related to their classroom practice. The conference could be as short or as long as the teacher and teaching partner wished it to be. Furthermore, the conference should be one that would normally be held: it should not be contrived for the benefit of the study. Teachers were also instructed to record the time and date of the conference on the label attached to the audio tape.

All teacher and teaching partner pre-measures, with the exception of recorded conference audio tapes, were collected by the researcher the last week of November 1991. A total of 17 out of a possible 26 teachers working with teaching partners returned recorded conference audio tapes by this time. Two more teachers returned pre-measurement conference audio tapes by February 12, 1992. The seven remaining teachers stated that they had conferenced, in one case twice by the last week of November 1991, but that he or she had forgotten to record the conference.

To obtain post-measurement data, teachers were contacted by telephone during the last week of March 1992 to remind them that the researcher would be visiting them at their schools to drop off the last set of questionnaires and to schedule classroom observation and pupil questionnaire administration times during May 1992. During the first week of April 1992, teacher and teaching partner questionnaires, an audio tape for recording a conference, and a return envelope with sufficient postage for mailing the questionnaires and the audio tape, were distributed to all teachers working with a teaching partner. Teachers not working with a teaching partner were given only a teacher efficacy scale and a return envelop with sufficient postage for mailing the questionnaire.

Teachers who had not returned the questionnaires or the audio tape by the time the researcher was collecting classroom observation and pupil questionnaire data in May 1992 were reminded to complete and return both. Teachers who had not returned either the questionnaires or the post-measure conference audio tape by the end of June 1992, were once again reminded. Completed questionnaires

were obtained from all teachers and teaching partners. Conference audio tapes were obtained from 17 of the 26 teachers working with a teaching partner. The reason for not having a conference audio tape given by seven of the teachers (the same seven who had not provided a conference pre-measure audio recording) was that they had forgotten to record the conference when it occurred. Two teachers stated that due to a lack of time to conference, they--along with their respective teaching partners--had not completed their last planned collaborative consultation cycle for the year which they had originally planned to record for the study.

Pupil questionnaires and report cards. The protocols for administering the SASC and the OCIW scales will be elaborated below. The protocols are followed by a description of how pupil report cards were obtained.

The protocol used for administering the SASC scales involved a total of nine steps. First, the researcher passed the scales out to the pupils participating in the study. The teacher either left the room or sat at his or her desk doing something unrelated to the pupils' tasks. Pupils who chose not to participate in the study or who did not have parental permission to participate were given an assignment unrelated to the study. Second, the researcher had the pupils complete a coded identification slip which was removed from the questionnaire and placed face-down on a corner of each pupil's desk for subsequent collection by the researcher. The concept of anonymity was explained and stressed. The researcher read through the directions on the first page of the questionnaire with the pupils pausing at the end to answer any pupil questions. Third, the researcher worked through an example on the first page with all the pupil participants. It was stressed that their opinions were important in this questionnaire; an answer was correct if they individually thought it to be right. Fourth, pupils were told that if they did not understand any words to raise their hands and the researcher would explain the words to them. Fifth, pupils were told to complete each scale only when they had been told to do so; they were not to go on without being instructed. Sixth, after answering any questions or clarifying any ambiguities, pupils were told to turn the page to the first scale. Seventh, the researcher read the phrase indicating the attitudinal object of interest that pupils were to consider as they completed the scale; the meaning of the attitudinal object was explained by the researcher. If any questions or ambiguities arose, they were answered by the researcher. When all pupils had

completed the scale, everyone was instructed to turn to the next scale. Eighth, step seven was repeated for the remainder of the scales; the researcher circulated throughout the classroom collecting the coded identification slips. Ninth, the researcher collected all SASC scale booklets. As the booklets were collected, the researcher checked the responses to ensure that no items had been missed or otherwise improperly marked; any errors or omissions were identified to the questionnaire taker and correction were made.

Descripions of the five attitudinal objects of interest which were expected to pose interpretive difficulties were generated and used with all pupils. The following is a list of those attitudinal objects and how they were described to pupils:

> *classmates in general:* this refers to how you feel about all of the other pupils in your class overall, do not just think about one or two people in particular; think about how you feel about everyone;
>
> *school:* his refers to the building and all of the people in it, including all of the pupils, all of the teachers, teacher's aides, the secretaries, principal, vice-principal, even the janitors and the people who take care of the felds;
>
> *learning in general:* this refers to any time you are learning something new, it doesn't have to even be in school although it can be; it could be a new sport or game--think about any time you are learning about anything you did not know about before;
>
> *social studies:* this refers to the subject in which you learn about other people--what they do and how they live, other places--where other places are, these people and places could be from the past or the present.
>
> *language arts:* this refers to any time you are reading, writing, spelling, or spealing.

The proocol used for administering the OCIW scale involved the five steps elaborated below. First, the researcher passed the questionnaires out to the pupils partidpating in the study. The teacher either left the room or sat at his or her desk doing something unrelated to the pupils' task. Pupils who chose not to participate in the study or who did not have parental permission to participate were given an assignment unrelated to the study. Second, the researcher had the pupils compete a coded identification slip which was removed from the questionnaire and placed face-down on a corner of each pupil's desk for subsequent collection by the researcher. The concept of anonymity was repeated and re-stressed. The researcher read through the directions on the first page of the questiomaire with the pupils pausing at the end to answer any pupil questions. Third, the researcher then worked through an example on the first page with al the pupil participants. It was stressed that their opinions were

important in this questionnaire; an answer was correct if they individually thought it to be right. Fourth, pupils were told that if they did not understand any words to raise their hands and the researcher would explain the words to them. Fifth, pupils were told to think about what their present class was like with their present teacher running it as they completed the scale. Pupils were then told to open their booklets and begin the questionnaire. As the pupils were completing the questionnaire, the researcher circulated throughout the classroom collecting the coded identification slips, answering any questions as they arose (e.g., "What does immediately mean?" "What does interruptions mean?"), and collecting the completed questionnaires. As the booklets were collected, the researcher checked the responses to ensure that no items had been missed or otherwise improperly marked; any errors or omissions were identified to the questionnaire taker and corrections were made.

Copies of report cards of pupils who were participating in the study for both pre-measures and post-measures were obtained in several different ways. Many report cards came directly from the classroom teachers to the researcher. Some were obtained through various intermediary steps from the school office. No difficulties were experienced in obtaining pupil report cards for use in the study.

Data Preparation

The focus of this section is on how the data were prepared for analysis. This section is broken into two sub-sections, the first dealing with questionnaire data; the second, with anecdotal and conference data. Raw data from all questionnaires were entered into a computer spreadsheet (Borland International's Quatro-Pro 3) and transformed into item scores for each questionaire administered.

Questionnaire data. Following the collection of questionnaire data, each survey was assigned an arbitrary subject number; all post-measure surveys were assigned the same arbitrary subject number as the pre-measure surveys. To help describe the makeup of the sample, data for a number of demographic characteristics were collected. The demographic variables of gender and teaching partner position within the district were assigned arbitrary identification codes (e.g., males were coded "1," females were coded "2"). To maintain maximum precision for the teaching partner position variable, every different position

listed by the 26 teaching partners was assigned a different code (e.g., classroom teachers were coded "1," school level resource teachers "2," school librarian "3," and vice-principals/teachers were coded "4"). Other demographic variables (e.g., total teaching experience, teaching experience in the district, teaching experience in the present school) were coded according to the numbers provided by the teachers regarding their teaching experience.

Pupil report card data. Pupil report card data (letter grades) regarding achievement (e.g., language arts--reading and writing grades were averaged, math, science, and social studies) were coded using a four point grade point average (GPA) type scale.[15] For those schools not issuing achievement grades, pupil report cards--with the names removed--were read by three elementary level teachers; each teacher assigned a grade for the subject areas of language arts, math, science, and social studies for each pupil report card.[16] The subject matter grades, assigned by all of the teachers, were then averaged to obtain an overall achievement grade.[17]

Conference Data. This subsection deals with the qualitative conference data collected in the study. Audio taped conference data were collected for analysis for the purpose of determining a teacher's conference reflective index. The reflective index then became a quantitative measure used in the statistical analyses.

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[15]The scale was as follows: "A+, A, A-" were assigned a "3," "B+, B, B-" were assigned a "2," "C+, C, C-" were assigned a "1," "D+, D, D-, F" were assigned a "0") Similarly, pupil report card data regarding behaviour were coded using a three point scale (e.g., "good" was assigned a "2," "satisfactory" was assigned a "1," and "needs improvement" was assigned a "0."

[16]The three teachers had 4, 8, and 9 years, respectively, of teaching experience at the elementary and intermediate level.

[17]The teachers were told to assign numerical grades according to the following schema: students achieving "very good" or "excellent" were assigned a "3," students "doing well" or "good" were assigned a "2," students performing "adequately" or "average" were assigned a "1," pupils performing "below average," "poorly," or needing improvement" were assigned a score of "0." Inter-rater reliabilities for the pre- and post-measures were .86 and .87 respectively.

Segments of discussion with common themes were identified within each conference. Each of these segments was then searched for evidence of the existence of the following points:

(1) identification of a perplexing or surprising event or condition--a problem,

(2) relating past experience to the current problem to reformulate the problem,

(3) deriving hypotheses and testing them logically.

The segments of discussion within a conference were coded as follows: (1) "reflective," if all of the above points were evident; (2) "thoughtful," if the discussion lacked either points two or three; and, (3) "information exchange," if the discussion did not contain item one.[11]

A conference reflective index was then obtained by assigning the following numerical values to a conference: (1) a "0" if all of the segments were deemed to be of the information exchange type. (2) a "1" if at least one of the segments was deemed thoughtful but no segments were deemed reflective, (3) a "2" if at least one segment of the conference was deemed to be reflective. The RI ranges from a minimum of 0 to a maximum of 2.

[11]Information exchange is possible when a teaching partner simply provides the teacher with a series of observations or raw data--there is no discussion in the true sense of the word.